



YSI incorporated



YSI Profiler

YSI Profiler System

User's Manual

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Section 1

Introduction

1.1 System Overview

The YSI Profiler is an integrated system of hardware and software, typically mounted to a floating platform (pontoon or buoy). The Profiler is anchored at a predetermined site on a lake, reservoir or bay, and used for vertical profiling a column of water. The system employs a YSI sonde to periodically measure water parameters in the column. The user inputs information through YSI Profile Wizard (PC-based) to create a program that is downloaded to a Campbell Scientific CR10X data logger that resides on the Profiler platform. The CR10X controls the Profiler winch to move the sonde up and down through the water column and command data from sensors at specified intervals. The system may also include a depth sounder (or fixed reference sonde), compass and meteorological sensors for collecting additional data at the site. The remote data collection system operates on programmed software instructions, and when polled, it sends data via a wireless communication link back to one or more base stations. LoggerNet™ is a PC-based program used to communicate with the CR10X data logger, which keeps track of the last samples uploaded. The YSI Profile Data Manager™ is a PC-based program that may be used to analyze and manage profile data.

1.2 System Description

The YSI Profiler pontoon version consists of the YSI 6960 Controller Assembly and the YSI 6955 Winch Assembly, both mounted to a T-Frame support. Figure 1-1 should help you to visualize the hardware. The software programs are described in later sections.

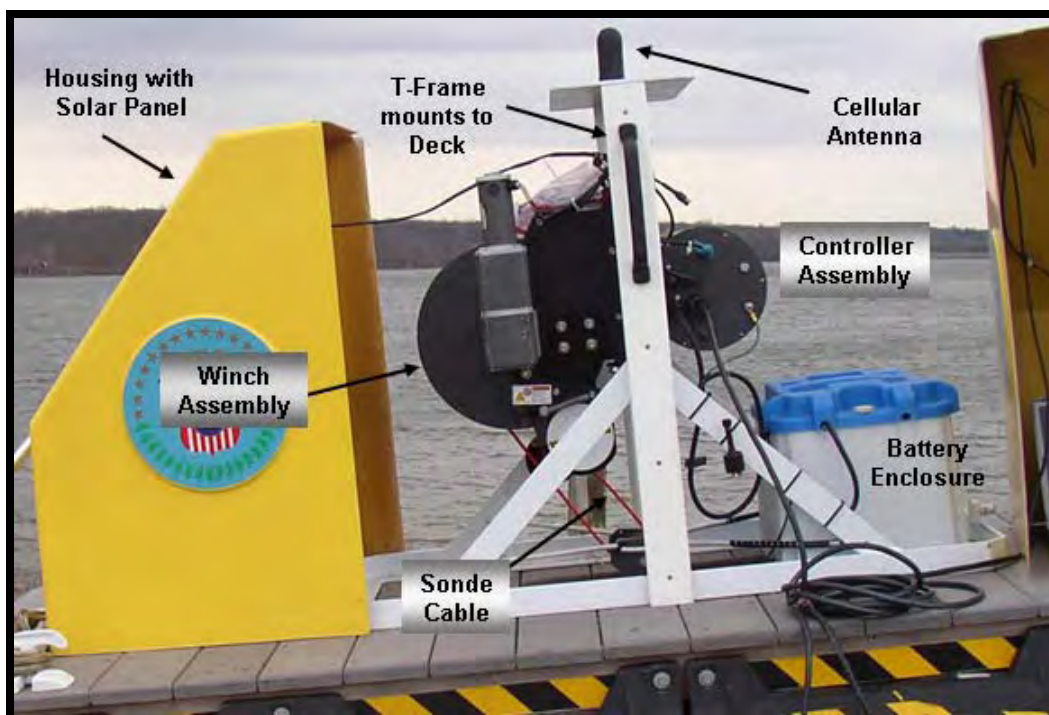


Figure 1-1 Profiler Platform: On Boat Ramp for Pre-deployment Check (Panels Removed)

The YSI Profiler System may be configured in a fixed station version as shown in Figure 1-2. Here the YSI 6955 Winch Assembly is mounted to a pylon and the YSI 6961 Controller Assembly is rail-mounted and housed inside a NEMA enclosure.



Figure 1-2 YSI Profiler Fixed Mount Version: mounted to pylon and guard rail

The YSI 6960 (or 6961) Controller is the heart of the system. It includes a Campbell Scientific CR10X-2M data logger, an SDM SIO4 module, a motor control system (with two relays), a watchdog timer and a communication module. These components are housed within a watertight enclosure to protect the electronics from the environment. In Figure 1-4, gray shaded components are those housed within the enclosure. Note that variable water depth can be monitored by the Depth Sounder or a Fixed Reference Sonde depending on the deployment requirements.

The CR10X program executes commands that collect information from the sonde and various peripherals. This information is then used by the CR10X to strobe its I/O ports and performs mechanical actions, such as energize the power relay that controls the winch motor to move the sonde to a new location in the water column.

The YSI 6955 Winch Assembly is driven by a 12 VDC motor. The Winch Assembly includes a reinforced Kevlar® sonde cable that is approximately 0.3 inch in diameter and 15 meters in length for vented cables. For non-vented cables sonde cables the diameter is approximately 0.25 inch with lengths from 30 to 100 meters. The Winch Assembly is primarily composed of PVC and Delrin® parts to maximize resistance to environmental damage. The motor is a small horsepower motor geared down to lift the required weight of a YSI sonde (including attached weight and cable). The total weight of the sonde in water is about 8 lbs. The motor is coupled to the drum axle via a robust planetarium gear assembly that incorporates a 90 degree gear coupler. The Motor Control Circuit Breaker module is controlled by the CR10X. It functions as the main power OFF/ON to the motor and as a current limiter. In the event the motor draws excessive power, the current increases. Once it reaches a set threshold the module terminates motor power.

The program makes a second and third attempt to run the motor. If current threshold is still exceeded, the program aborts to SETUP mode.

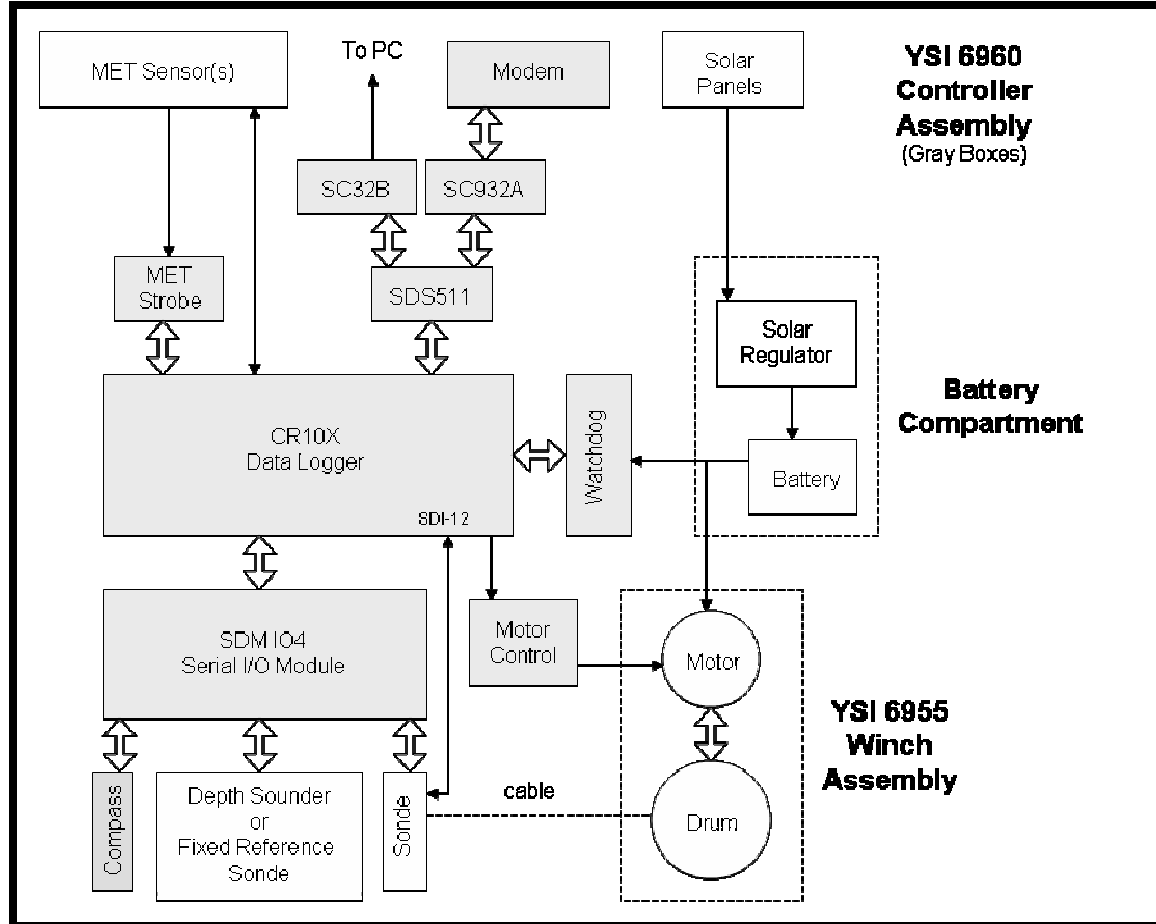


Figure 1-3 Block Diagram – YSI Profiler Control and Winch Assemblies

The Watch Dog circuit provides a 90 to 120 second power interrupt to the CR10X in the unlikely event the program fails to execute as expected. It takes approximately 36 hours of no SDM I/O port activity for the Watch dog to time out. After 36 hours the program will re-initialize to SETUP mode which then requires manual operator intervention to restart the profiling program.

A belt-driven diamond screw and a V-roller suspension assembly help guide the sonde cable as it moves in and out of the winch drum. This level wind mechanism is powered and synchronized by the motor drive timing pulley. The design of the driving pulley, the speed reducing pulley, and the reverse screw allows the cable carriage guide to move laterally at the correct speed to properly lay the cable on the drum. See Section 3 for details.

Other components required for the system include a 12 volt battery, solar panels, and solar charger/regulator. Optional equipment includes a depth sounder (or a fixed reference sonde) to measure the water level, meteorological sensors, beacons, telemetry modules, antennas, compass, and counter weights for stabilizing the platform.

When connected the Winch and Controller assemblies perform the required steps to collect sonde data from the water column. The sequence at which it collects data depends on how the software program is set up. Information in the following sections provides step-by-step instructions that take you through pre-deployment setup operations, some tips on deployment, and routine maintenance of the Profiler system.

1.3 Getting Started

Core components of the YSI Profiler are assembled and tested at the factory. Some assembly will be required after delivery depending on what you ordered and what arrangements you made when the system was purchased. In addition, some components specific to your application may need to be installed. Contact information for YSI and Endeco/YSI can be found in Appendix A.

Initial Inspection

Carefully unpack components and accessories of the system. Visually inspect all parts for damage. Compare received parts with materials listed on the packing list included with your system. If any parts or materials are missing or damaged, contact Endeco/YSI.

Sonde

The Profiler system requires the use of a YSI 6-Series Sonde with a depth sensor. Please refer to the Operations Manual accompanying the sonde for configuration and calibration details. You will be prompted to enter specific sonde information that can only be set in the sonde menu. To communicate with the sonde you need a terminal emulator program on your PC such as YSI EcoWatch™, Microsoft® HyperTerminal, or the equivalent. You may also use the YSI 650 MDS handheld monitor. Specific instructions can be found in Section 3 of this manual. You will be prompted by Profile Wizard to verify these sonde settings during pre-deployment configuration.

Software

Three PC software programs are available with your system. In Section 2 there are specific instructions for installing these programs on your PC. The first, YSI Profile Wizard provides you with step-by-step screens that allow entry of key parameters that define your profiling routine. These parameters are then used to configure the controlling software. If you have not done so, take time to sketch out your vertical profiling objectives, including depths, parameters to be measured, intervals, up/down or down/up preferences, and any other information you think relevant. The second software program is LoggerNet™ (licensed from Campbell Scientific Inc.). This program allows you to communicate with the CR10X data logger that resides on the Profiler platform. It is used to download profile information that you defined in Profile Wizard. LoggerNet™ comes with a separate manual. You should take time to review this manual prior to setting up your system. The third software program is Profile Data Manager™. You use this program for data analysis once data is collected. You will learn more about this program in Section 7.

Hardware & Electronics

The major hardware/electronics components of the system are preassembled and tested at the factory. Most of these components mount to the T-frame that you see in Figure 1-1. The T-frame assembly is shipped to you, and must be mounted to the deck of the float. After factory testing

some components are dismounted for safe shipping. These will need to be remounted. More about hardware components are covered in Sections 3, 4 and the Appendix.

Once your software is installed, you are ready to proceed with a profile routine, equipment staging, and pre-deployment checks. As always, the extra time you spend to verify that your system is properly working prior to deployment, results in a successful working system after deployment.

Examples of Deployed Profiler Systems

Below are examples of the most common Profiler deployments. In many setups meteorological sensors are employed along with the sonde, especially in coastal applications. Anchoring techniques vary with application. In Section 6, you will find information related to deploying a Profiler system.



Figure 1-4 YSI Profiler with MET sensors on Pontoon Float



Figure 1-5 YSI Profiler at Fixed Station



Figure 1-6 YSI Profiler on Buoy Float

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Section 2

Profile Routine

2.1 Software Installation

The Floating Profiler System comes with three PC-based software programs. The minimum required PC operating system is Windows 2000, however we recommend Windows XP. Install all three programs on a single computer for optimal performance. The following instructions assume that drive D: is a CD-ROM drive on the computer to which the software is being installed. If your drive letter is different, substitute the appropriate CD-ROM drive letter into the instructions below.

Profile Wizard

Load the installation disk into the CD-ROM drive. This activates the Profile Wizard Installation Utility. Follow the prompts on the screen to complete the installation.

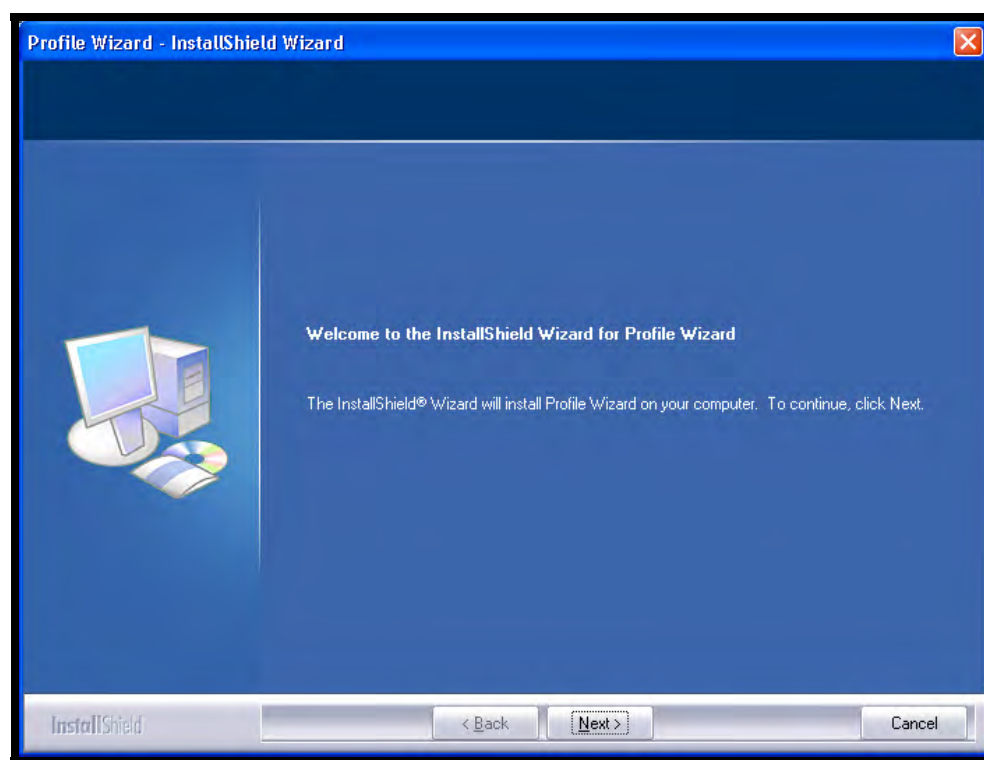


Figure 2-1 Opening Screen for Profile Wizard Installation

If the screen shown above does not appear, go to the Windows system menu. Select Start | Run. Type D:\Setup.exe in the open field, and then press OK.

During installation items are added to your computer's Start menu under Programs | YSI | Profile Wizard that start the wizard. If the default directories are used, Profile Wizard

executable files and help files are placed in the C:\Program Files\YSI\ Profile Wizard\ directory.

Once installed, Profile Wizard allows you to create a profiling routine. It contains simple instructions (enhanced by graphics) that are easy to follow. If you enter inconsistent information, pop-up messages provide messages to get you back on track. The end result is a file that you name and save. This file contains specific profiling information that will be downloaded to the CR10X data logger that resides on the floating platform.

LoggerNet™

Load the installation disk into the CD-ROM drive. This activates the LoggerNet™ Installation Utility.

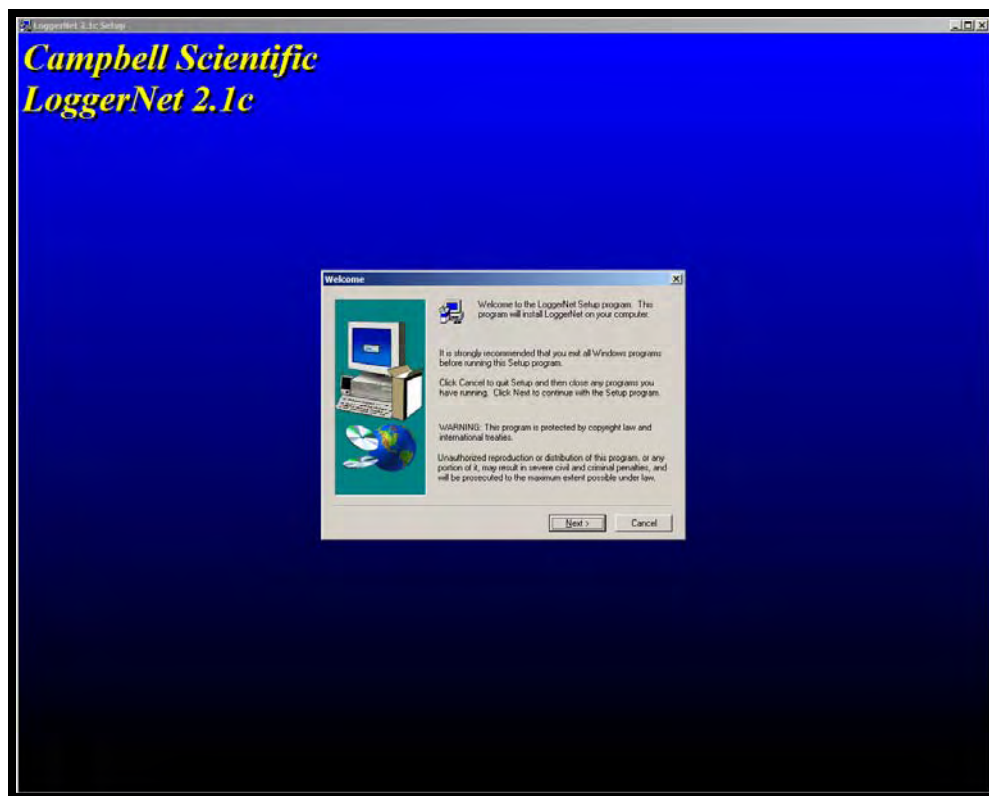


Figure 2-2 Opening Screen for LoggerNet™ Installation

Follow the prompts on the screen to complete the installation. You may need to access the Internet to complete the installation. This activates the LoggerNet Installation Utility.

If the installation program does not start, then go to Windows system menu, select **Start | Run**. Type **D:\Disk1\Setup.exe** in the open field or use the Browse button to access the CD-ROM drive and select the setup executable file in Disk1 folder.

Items are added to your computer's Start menu under **Programs | LoggerNet** that start the Toolbar and other selected utilities. If the default directories are used, LoggerNet™ executable files and help files are placed in the **C:\Program Files\CampbellSci\LoggerNet** directory. The directory **C:\CampbellSci\LoggerNet** is a working directory and contains the user

programs and data files, along with files maintained by LoggerNet™ such as the binary data cache and configuration files.

Once installed, LoggerNet™ allows you to communicate with the Campbell Scientific CR10X Data Logger via RS-232 direct or wireless. Instructions from Profile Wizard will be downloaded to the CR10X. Pre-deployment checks using LoggerNet™ may also be performed.

Profile Data Manager™

YSI Profile Data Manager is a third program that you may have purchased with your Profiler system. Contact Endeco/YSI for pricing information if it was not included in your original order.

Load the installation disk into the CD-ROM drive. This activates the Profile Wizard Installation Utility. Follow the prompts on the screen to complete the installation.

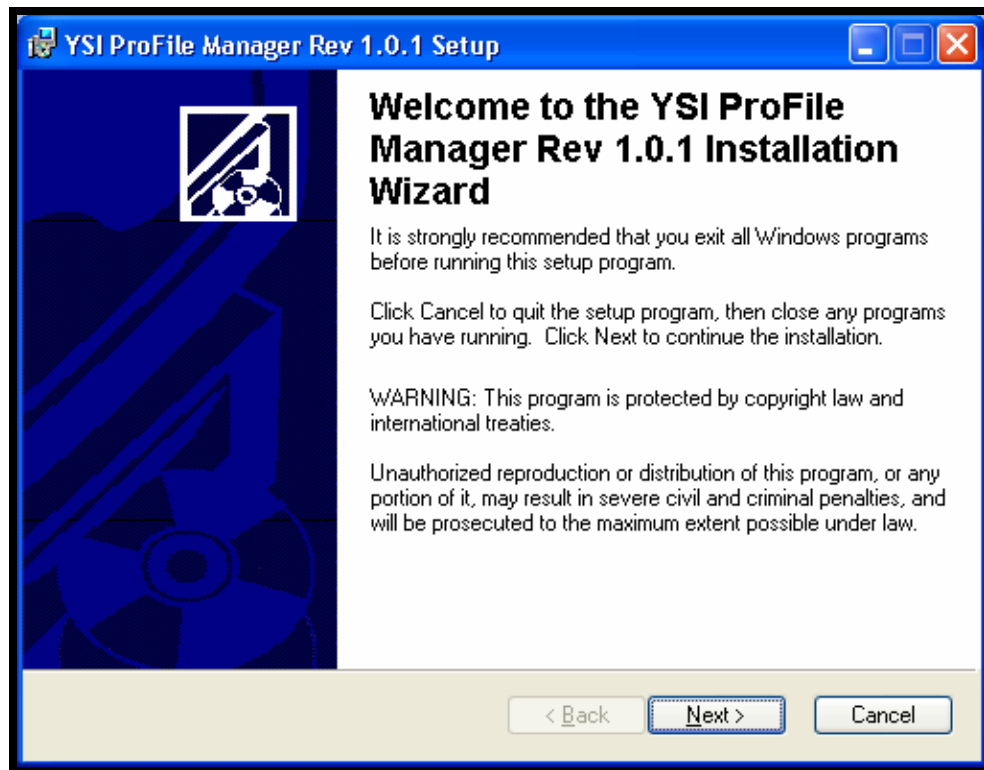


Figure 2-3 Opening Screen for YSI Profile Data Manager Installation

If the install does not start, then go to Windows system menu, select **Start | Run**. Type **D:\Setup.exe** in the open field or use the **Browse** button to access the CD-ROM drive and select the setup executable file.

Items are added to your computer's Start menu under Programs | YSI | ProFile Manager that start the program. If the default directories are used, Profile Data Manager executable files and help files are placed in the C:\Program Files\YSI\ProFile Manager Directory. YSI recommends a separate subfolder for each deployment site.

Once installed, Profile Data Manager™ allows you to organize, report, and plot data from your profiling routine. You will learn more about Profile Data Manager in later sections of this manual.

Your PC-based programs should now be installed and ready to use. You will next create a file that defines your profiling routine. In order to create this file using Profile Wizard, you will need to verify that certain sonde parameters are set properly. Refer to instructions below that describe how certain sonde parameters must be set. You may also refer to Section 3 in this manual for more detail on these sonde settings.

2.2 Using Profile Wizard to Create a Profiling Routine

You are now ready to create a file with information that describes your profiling routine. Make certain your YSI sonde is configured properly, and calibrated for parameters you wish to measure. It is recommended that you sketch out your profile plans. This will help you work through Profile Wizard minimizing the need to backtrack and recalculate. See the example in Figure 2-4.

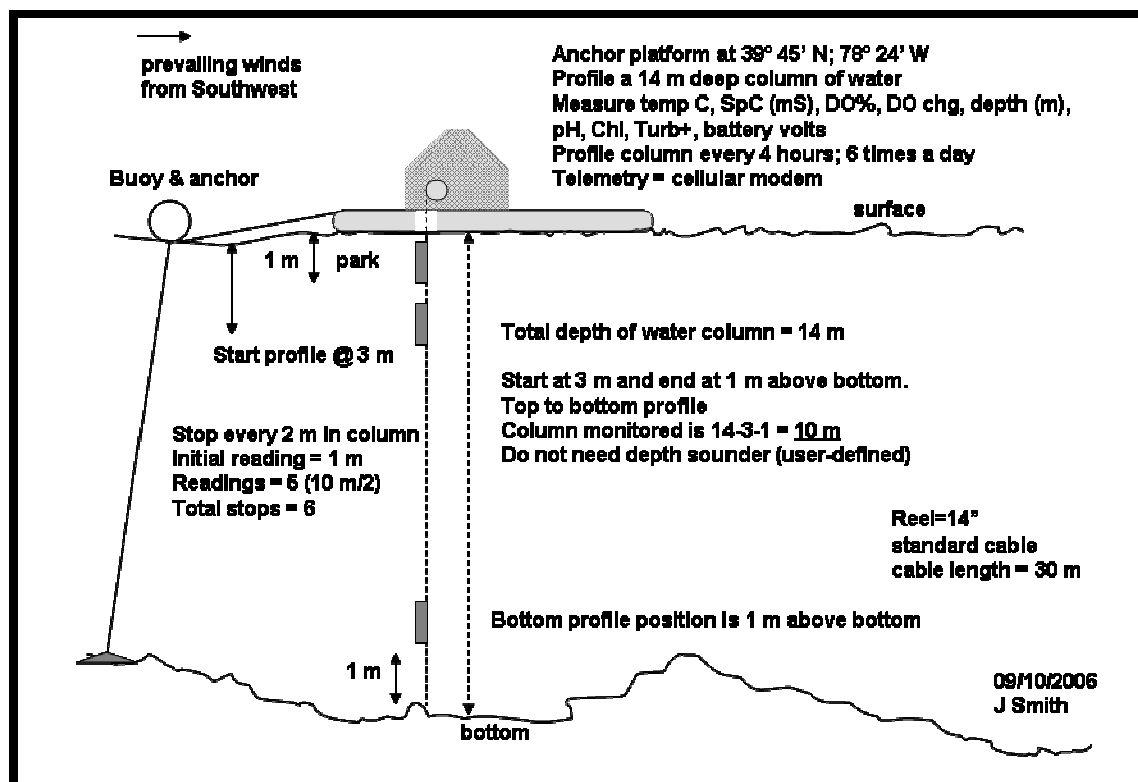


Figure 2-4 Pre-Deployment Sketch; Information for Executing Profile Wizard

SETTING UP A PROFILING ROUTINE

With basic configurations set in your sonde, use your notes on your profiling objectives to proceed with Profile Wizard. There are several parts to setting up the file and each will be discussed below. Following this description a step-by-step setup example will be described with screen shots of each step of Profile Wizard. Below are some definitions of key terms used in the setup. In addition to knowing the water depth at your profiling site, you also need to define the column you want to profile and where you want to park the sonde between profile routines. You will need to know where to START, where to END, and where to PARK. All must be defined in units of meters relative to the surface of the water.

The PARK depth (required entry) can be anywhere in the water column. This is where the sonde will reside when it is not actively profiling a water column.

The START position (required entry) is the first point in the water column where data is collected. This can be close to the surface, near the bottom or anywhere in between. The Profile Wizard program also requires an entry selection to profile from TOP TO BOTTOM or BOTTOM TO TOP.

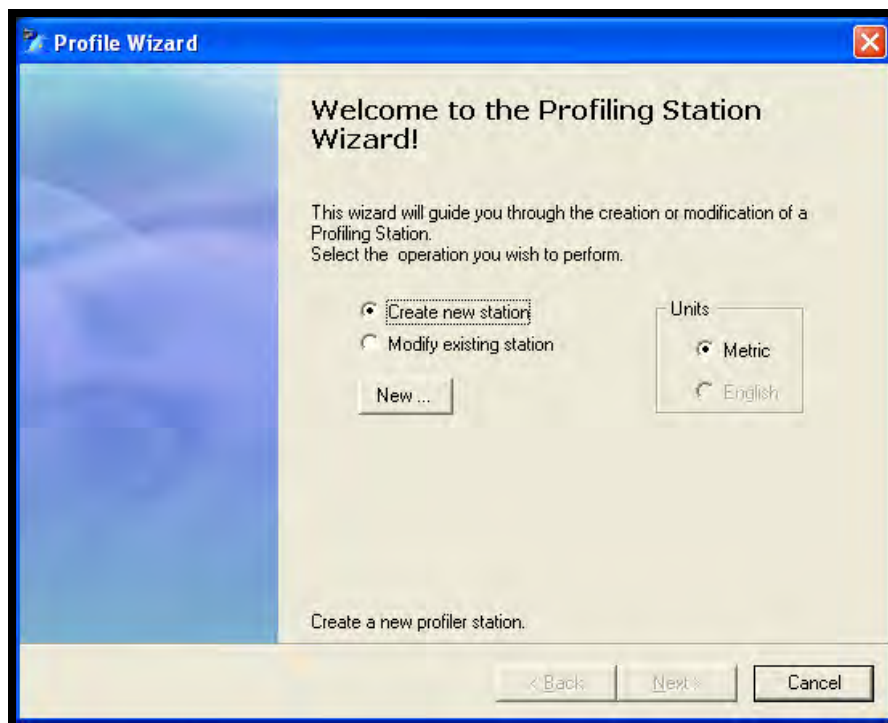
The END position (required entry) is the last step the Profiler can take. If the sonde goes any further, it may come out of the water or hit bottom. The END step is the only step that will vary in size from the other steps and is typically less than a full step size.

The PROFILE DURATION is the time it takes to go from PARK to START, perform all measurements at each interval step, and then return to PARK.

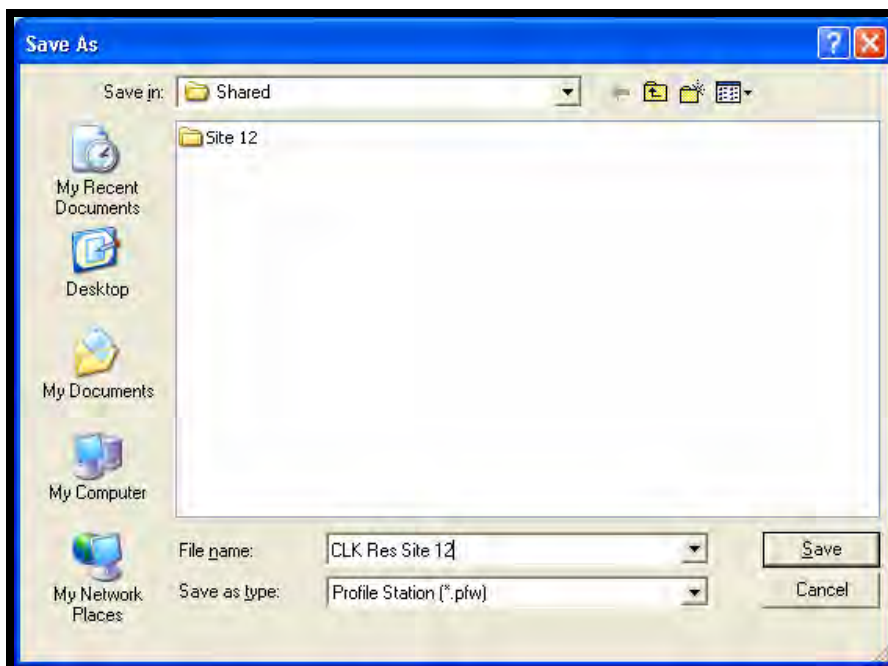
Park position is where the sonde typically spends most of its time. For example, a profile may take 45 minutes to complete. So if you configure your system to profile every four (4) hours that would be six (6) times a day. If the profile takes 45 minutes, then the sonde resides in park position (idle) for 3 hours and 15 minutes of each profile. So the sonde is idle about 80% of any given day in this example.

If Profile Wizard is not open, do that next. Either double click on the Profile Wizard icon on your Desktop; or click on Start | Open | and then Browse to search for YSI Profile Wizard.exe. The opening screen (welcome screen) is shown below.

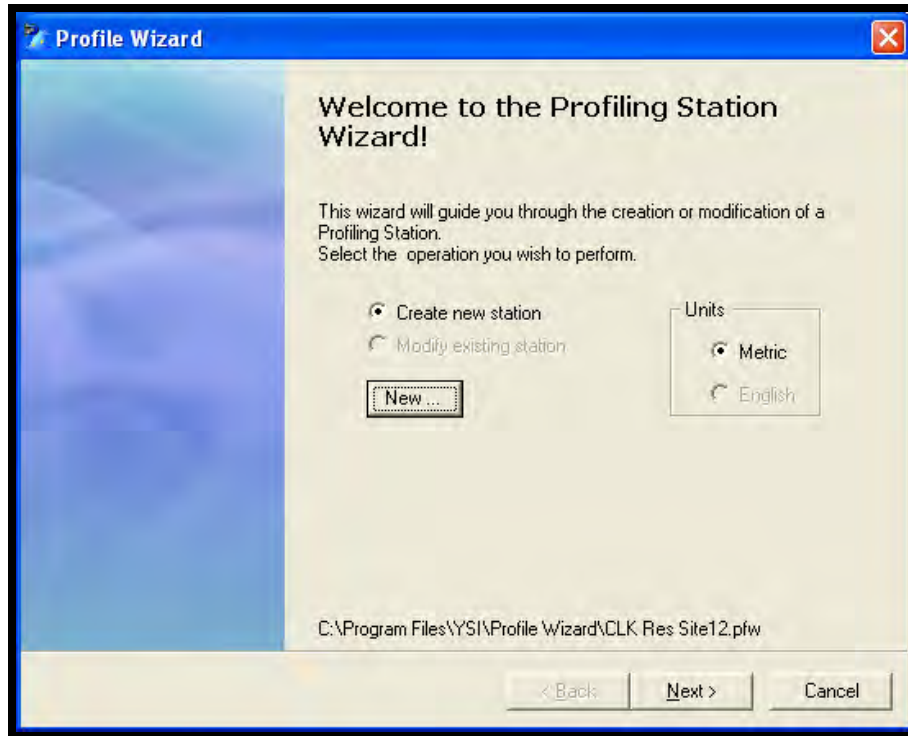
Note that there are two options in the welcome screen - Create new station and Modify existing station. Since you are creating a new station in this example, verify the tick is in the Create box. If you have a profiling routine defined by name, you may elect to open an existing file to modify it by using the 'Modify existing station' option.



Click on New... to view the Save As screen, and then type in a filename for your site. We recommend creating a new folder for each site configuration. In this example assume that this is Site 12 on Clark Reservoir. Click the 'create new folder' icon in upper right hand corner and rename the folder 'Site 12'. Open the new 'Site 12' folder and type in 'CLK Res Site12' for the filename ... click Save. The ".pfw" file will save in C:\ Program Files\ YSI\ Profile Wizard\ Shared\Site 12\.



Once you click on **Save** the welcome screen reappears, this time with the **Next ...** button active to proceed to the next step in Profile Wizard. Note also that Units are Metric, which at this time is the only option. English units (feet) can not be used in your calculations and setup. (One meter is approximately 3.281 feet). Finally, take note that the directory path and filename you assigned is shown near the bottom of the screen



Now Click on **Next >** to proceed to one of five 'General Information Steps'. This is where you will enter critical information to define your profiling routine. Have your notes on hand before proceeding.

Information (Steps 1-5)

In the first Step (General Information), you must indicate if you will use a depth sounder or fixed reference sonde in your operation. In this example assume there is no depth sounder sensor or fixed sonde in the system. Below are examples of applications where you may choose using a depth sounder or fixed sonde, including its advantages in those specific applications.

You must also indicate in Step 1 if you have meteorological (MET) sensors or a compass in your system. If there were a solar radiation sensor, a constant will be provided by YSI. In this example, assume there are no MET sensors in use.

There are three bottom depth options: 1) user-defined; 2) using a depth sounder sensor; and 3) using a fixed reference sonde. The descriptions and the table below should help you choose the appropriate setup for your application.

User defined applications are typically employed when the winch and electronics can be mounted to a fixed structure. The water level should not change significantly in depth and extreme bottom monitoring is not important.

Depth sounder applications are often used to track the bottom of a body of water and adjust the program to get within a specified distance from the bottom.

Fixed reference sonde applications are used to track water level and adjust the program to a specified distance from the bottom, but it is always used with fixed mount winch and electronics.

Type	Mounted to	Water dynamics	Monitoring...
User defined	Pier Bridge Pilling Float	Slow change in water level	Near surface area only
Depth sounder	Pontoon Float Buoy	Variable water depth	Track bottom
Fixed reference sonde	Pier Bridge Pilling	Variable water depth	Track water level

In Step 2 (Winch Information) you must enter the reel size, cable type and length. The Reel diameter of the Winch Assembly is 14 inch (35.56 cm) in this system and the Cable type is Standard. These two questions have default answers at this time. Future options are planned.

The Cable length in this example is 30 meters. You order the cable length that best fits your application. Typically there is at least one extra meter of cable shipped to allow some amount of cable to remain on the reel at all times for proper winding. If you order 30 or 50 meter cable, you will receive at least 33 meters or 53 meters, respectively.

In Step 3 (Site Information) enter your choice of profiling direction; 'Bottom to Top' or 'Top to Bottom' profiling. Refer to your notes and you will see that 'Top to Bottom' was declared as the Profiling direction in the example application.

The maximum depth of water in the profiling area is 14 meters. The predetermined park depth was noted at one (1) meter below the surface. Type in these numbers and proceed by clicking on Next >.

Site - Step 3 of 5

Site Information.
Input the direction and depths.

Profiling direction
☐ Bottom to top ☒ Top to bottom

Depth information

Maximum water depth this site will reach. (a)
Maximum water depth : 14 meters

Distance from surface where sonde parks between profiles. (b)
Park depth : 1 meter(s)

< Back Next > Cancel

Step 4 (Study Information), shown below, deals with defining the actual column length of water to step through and the time interval at which you intend to monitor.

Since the sonde starts at three (3) meters below the surface and proceeds through five-plus steps, stopping no further than one (1) meter above the bottom, the actual monitored column of water is ten (10) meters, start at 3 meters and end at 13 meters below the surface. You must enter the Start and End depths (relative to the surface) in the appropriate boxes (see below).

In addition, you must enter the profiling step interval. In this example two (2) meter steps are used, meaning the cable will complete one set of measurements, then pay out two meters, stop and repeat these measurements. This will be repeated until it reaches the bottom of the profiling column (13 meters below the surface). The last step is often less than the defined interval if the profiling depth is not evenly divisible by the number of steps. In this case 10 meters divided by 2 meter intervals work out to be a whole number.

The Profiles per day are 6, indicating that a profiling routine will be initiated every four (4) hours beginning with local time of 00:00:00 (midnight). Enter six (6) into the appropriate box.

Profile - Step 4 of 5

Study Information
Input minimum depth, number of steps and the number of daily profiles.

Distance from water surface. (a)
Start Depth : 3 meter(s)

User defined depth from water surface. (b)
User defined end depth : 13 meter(s)

Desired distance for each step. (c)
Step size : 2 meter(s)

Number of profiles per day. (1 - 24)
Profiles per day : 6

< Back Next > Cancel

At this point you are ready to move to the next screen to verify specific information in the sonde menu and then to assign sonde report parameters. However, before moving to these last two screens, make note of how profile setup screens would differ if a Depth Sounder or a Fixed Reference Sonde were used to determine sonde vertical position relative to the top or bottom of the water column. After these examples, Profile Wizard setup screens will be displayed for the original example application.

Depth Sounder Option

The General Information Step 1 screen would appear as follows, marking the Depth Sounder with a click of the mouse. Step 2 and Step 3 related to cable/reel and site information, respectively would remain unchanged. Step 4 takes on a very different look since the final depth reading is referenced from the bottom. See figures below.

Fixed Reference Sonde Option

The General Information Step 1 screen would appear as follows, marking the Depth Sounder with a click of the mouse. Step 2 and Step 3 related to cable/reel and site information, respectively would remain unchanged. Step 4 takes on a very different look since the final depth reading is referenced from the bottom.

On the next two pages see the differences in setup screens when using the depth tracking options listed immediately above.

General Information - Step 1 of 5

Profiler General Information
Describes the profiler type and logic.

Bottom depth
Choose how the system measures bottom depth.

☐ User defined depth ☒ Depth sounder ☐ Fixed sonde

MET

☐ Do you have meteorological sensors ?

Solar calibration multiplier or calibration constant :

Solar resistor value : Ohms

☐ Do you have compass ?

< Back Next > Cancel

NOTE:

Step 2 (Cable/Reel Information) and Step 3 (Site Information) screens would appear the same as above in the User defined example. Steps 1 and 4 appear differently.

Profile - Step 4 of 5

Study Information
Input minimum depth, number of steps and the number of daily profiles.

Distance from water surface. (a)
Start Depth : meter(s)

Distance from bottom. (b)
End Depth : meter(s)

Desired distance for each step. (c)
Step size : meter(s)

Number of profiles per day. (1 - 24)
Profiles per day :

< Back Next > Cancel

General Information - Step 1 of 5

Profiler General Information
Describes the profiler type and logic.

Bottom depth
Choose how the system measures bottom depth.

☐ User defined depth ☐ Depth sounder ☒ Fixed sonde

MET

☐ Do you have meteorological sensors ?

Solar calibration multiplier or calibration constant :

Solar resistor value : Ohms

☐ Do you have compass ?

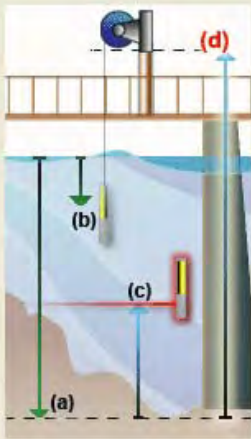
< Back Next > Cancel

NOTE:

Steps 2 (Cable/Reel Information) and Step 4 (Profile Information) screens would appear the same as above in the Depth Sounder example. Steps 1 and 3 appear differently.

Site - Step 3 of 5

Site Information.
Input the direction and depths.



Profiling direction
☐ Bottom to top ☒ Top to bottom

Depth information

Maximum water depth this site will reach. (a)
Maximum water depth : meters

Distance from surface where sonde parks between profiles. (b)
Park depth : meter(s)

Distance from bottom where reference sonde will be positioned. (c)
Reference sonde distance : meters

Distance from winch to site bottom. (d)
Winch height : meters

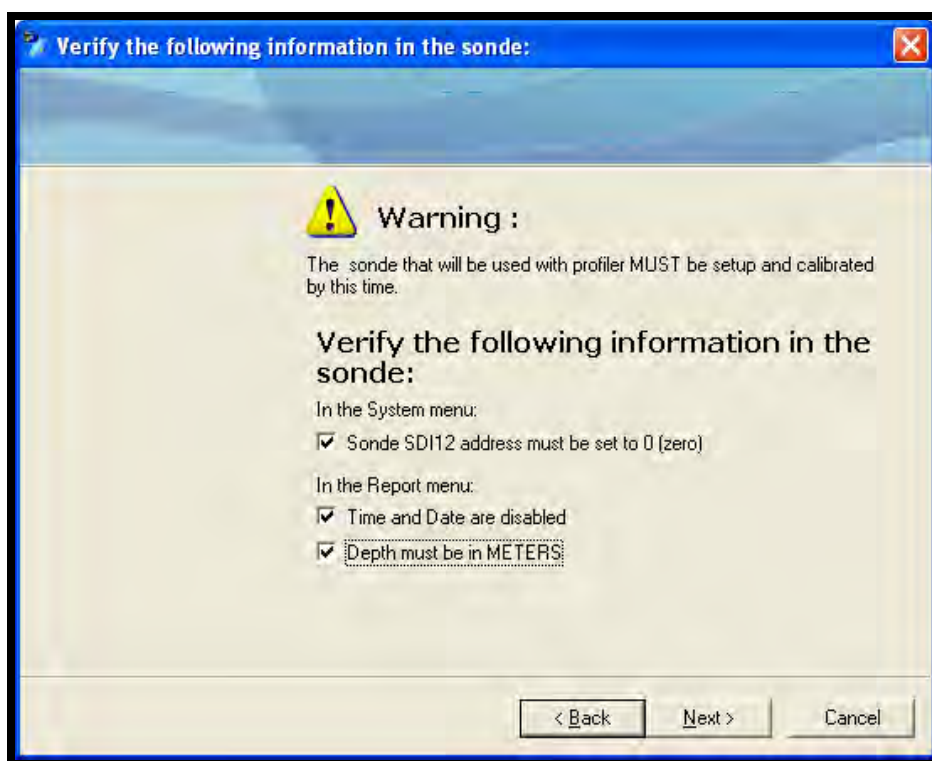
< Back Next > Cancel

Although infrequently used in this way the Fixed Sonde Reference may be positioned on the bottom of the water column. In this case the Fixed Reference sonde distance is entered as zero (0). If mounted above the bottom, you will need to determine a true measured distance from bottom to the “fixed point”. This distance can be determined by lowering the sonde to the bottom, record the instant depth reading, and then move the sonde to the desired fixed (or attached) location. You then subtract the two values and enter the result in location (c) on the screen.

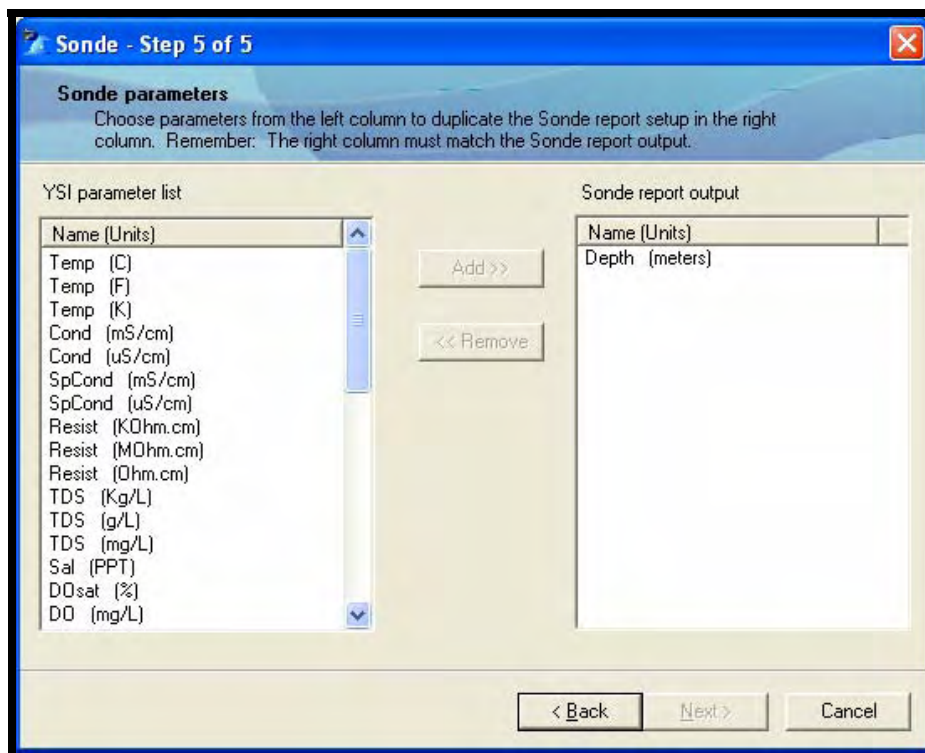
IMPORTANT:

The Fixed Reference Sonde must be set to have only two Report parameters enabled: **Temp in C, and Depth in Meters**. They must appear in the order shown and in the units of measurement shown. Also, do not set date or time.

After completing the above steps for User defined depth, Depth sounder or Fixed Reference Sonde, click on Next > and you will see a screen that asks you to verify that specific information in the sonde configuration is entered as stated.



The boxes are not ‘checked’ when the screen appears. You must verify that these sonde configurations have been set before the Next button becomes active. That is, you can not proceed until you click on each box. Once you confirm the sonde settings, click **N**ext > and proceed to the final step in defining your profiling routine.



In Step 5 (Sonde parameters) you must record in the box on the right all parameters you have chosen to monitor. You probably have jotted these down in notes. If not, return to the sonde menu and check the Report setup to make sure you have listed all parameters, in the same order as in Step 5 of the setup wizard.. Depth in meters is a given, and in fact, is listed by default in the Sonde report output column. You now click on each parameter and then click Add >> to add it to the list on the right. You may do this one at a time, or you may press and hold the Control key (Ctrl) on your keyboard and click on the appropriate parameters in the list on the left. The Add button becomes active. Click Add >> and the list on the right appears as shown below for this example. You may now need to rearrange the order of this list to match the sonde Report setup.

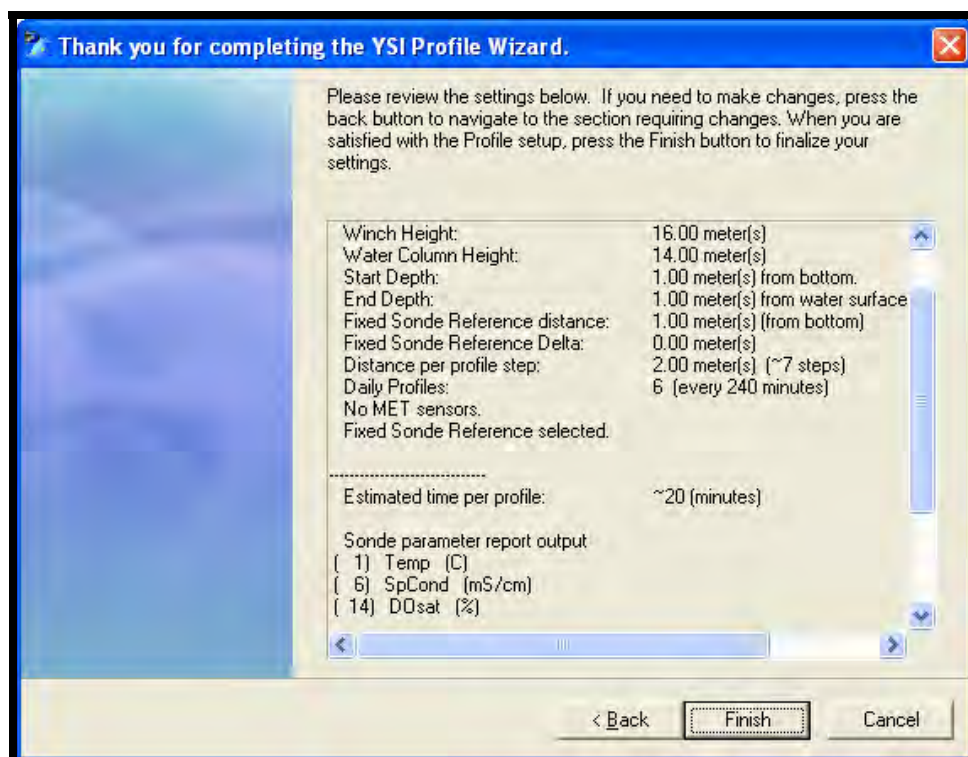
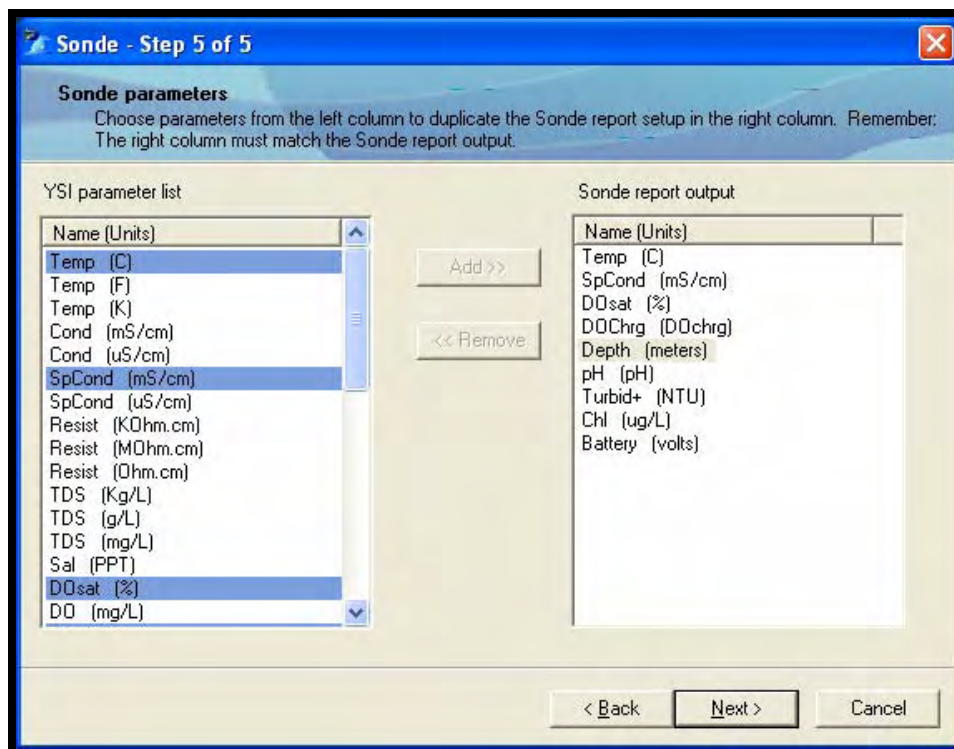
It is essential that the list of parameters you create matches the parameters set in your sonde (exact parameter, including units chosen and the order listed). For example, SpCond (mS/cm) is not the same as SpCond (uS/cm) this does make a difference when the CR10X data logger and sonde communicate during profiling routines. This makes a difference later on during post data processing

The screen below shows an example list of parameters. There are nine (9) parameters total. Depth in meters is a requirement. In Profile Wizard there is a maximum of twelve (12) parameters that you may list, counting Depth in meters as one of the twelve.

IMPORTANT:

The **order of parameters** listed must match the Report setup in the sonde.

In the following figure Depth (meters) was moved so that it occurs after DO Chrg but before pH. Parameters may be moved up and down the list by left **clicking and dragging up or down**.



The final screen summarizes all information that you entered. Check this carefully, make changes if necessary, and then click on Finish to complete the setup of your profile. Note the parameter ID numbers in brackets just to the left of the parameters; this information will be imbedded in the data file as Array 88.

You should at this time also print the '*.rpt' and '*.pfw' files for your hard copy records. See Appendix B for examples.

2.3 How the CR10X Executes the Profile Routine

Using Profile Wizard you have now created a profile routine file. In Section 3 you will learn to send this file to the CR10X data logger using LoggerNet™ software. Once in the CR10X this program controls the movement of the winch, sonde data collection, and other actions. Prior to moving to Pre-Deployment checks, and in order to better understand how the 'controller' software executes the profile routine, consider the description and example below.

Since a depth sounder was not used in the example above, it will be considered part of the routine below. In coastal applications, the tide can raise or lower the water level two or more meters at times. The importance of knowing the total depth of the water column at all times is essential. In tidal applications the use of a depth sounder is necessary if you intend to monitor close to the bottom or to the surface.

EXAMPLE & DESCRIPTION OF PROFILE ROUTINE WITH DEPTH SOUNDER

For better understanding of the steps in a profiling routine, consider a new example where the mean water depth is ten (10) meters and the daily tide is about two (2) meters. Assume the system has a depth sounder and the Profile Wizard setup has been programmed accordingly. The use of a depth sounder enables the system to track the overall water depth before the start of a profile and again during the last 20% of the water column that is being profiled.

Profile Parameters

Profiles per day	4
Step Size	1 m
PARK (relative to surface)	5 m
START (relative to surface)	1 m
END (relative to bottom)	1 m
Top to Bottom Profile	

In terms of 'profile logic', the CR10X goes through the following steps to ensure that depth and parameters are measured as intended by the profile program. This is done through RS-232 communications using a serial I/O interface that connects to the CR10X to various sensors and accessories.

Every six (6) hours starting at 00:00:00 (midnight) the program requests a PARAMeter check from the sonde. This information is collected to insure that the sonde is operational and the sonde parameters are unchanged. Once this information is received from the sonde and verified as correct, the program requests a sonde water depth. The sonde should be in Park position five (5) meters (+/- 0.2 m) below the surface. The information is collected, and then the overall depth is measured by the depth sounder. The overall water depth is collected and recorded as a reference to insure that the sonde will never hit the bottom during the profile.

The program next decides if the PARK to START move distance is greater than two (2) meters. It turns the motor on to move up or down while monitoring the sonde depth to see how close it is to the one meter depth (START). In this example the sonde was parked at 5 meters and was moving up 4 meters to the start position. As a result the "move to" distance is 4 meters. If the "move to" distance is less than two (2) meters, it calculates the time the motor needs to be

powered to travel the required distance. It then powers the motor for the calculated time and checks again to see if the sonde depth is within the ± 0.2 meter tolerance. If not, the motor is powered again until the sonde reaches the specified depth. The rate of movement is 0.1 meter/second, so a “step” may take a couple of minutes to reach its target.

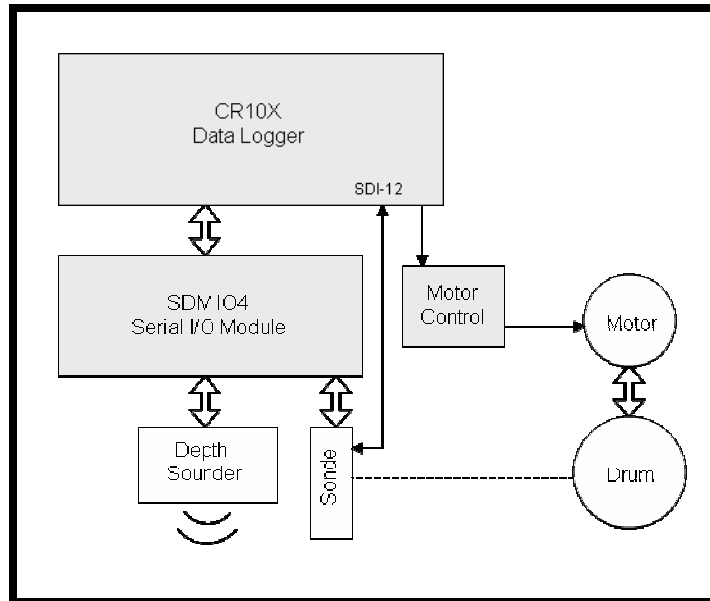


Figure 2-5 Block Diagram: Sonde Control with Depth Sounder

When the sonde reports it is within the START depth position of one (1) meter \pm the tolerance, it stops to stabilize for 60 seconds and then warms up for the specified DO warm-up time. Depending on the sonde default DO warm-up time values are set at 40 or 60 seconds. After about 100-120 seconds have expired, the CR10X sends an SDI-12 command directly to the sonde to start parameter measurement. When completed, the CR10X stores the sample data in a designated memory location. Therefore, all data in this memory array are SDI-12 measurements taken directly from the sonde to the CR10X data logger memory. This array 105 includes the Julian day, time stamp and sonde data. The time stamp indicates the end (not the beginning) of the sample collection.

Once the data is stored in CR10X memory, a command turns the motor on for a calculated period of time. This duration is the time it takes to move the sonde to the next step location (\pm the specified tolerance). The sequence described above repeats until the END step is completed.

While profiling up or down the program keeps track of the sonde depth. When it reaches approximately 80% of the overall water depth, the system checks the depth sounder again and determines the distance to the bottom. From this point on the program continually checks depth to insure it can do a full one meter step. Eventually, the step size of one meter is no longer possible without hitting the bottom. At this point a calculation by the program determines a partial step (typically 0.3 to 0.8 meters). When this step is completed, the CR10X issues the command for the sonde to return to PARK position, where it waits for the next profile time.

Since this example location has a tidal influence, the overall depth will change from profile to profile. The distance and/or steps may be more or less than a previous profile. Because this sequence started at the surface, all of the steps are referenced from the surface down. The opposite would be the case when starting at the bottom for a ‘bottom to top’ profile.

The data collected into the CR10X memory is then uploaded by LoggerNet™ either as forced upload or by the LoggerNet™ schedule. The data is archived in ASCII text, comma delimited format. Profile Data Manager™ software can then be used to view or FTP the data. Alternatively, you can import the ASCII text data file into a spreadsheet program like Microsoft Excel® as comma separated values. See Figure 2-6 for example data. Using Excel's filters you can then display particular array numbers for quick data analysis. See Figure 2-7 for an example with Array Number 60 (hourly MET reading). Refer to Appendix G for Data File Array Descriptions.

99	2006	220	1000	10	5407	0	99	0			
88	7	11	124	1	6	12	14	15	96	22	...
6	1	2	7.3	3	7.4	7.86	9	0			
105	2006	220	1002	43.5	25.32	45.21	29.24	88.8	6.18	44.1	...
105	2006	220	1004	35.38	25.43	45.11	29.17	89.9	6.25	43.1	...
105	2006	220	1006	24	25.63	45.06	29.12	92.1	6.38	43.1	...
105	2006	220	1008	14.5	25.78	45.05	29.12	93.3	6.45	42	...
99	2006	220	1009	6.125	5407	0	99	0			
99	2006	220	1030	9.88	5407	0	99	0			
88	7	11	69	1	6	12	14	15	96	22	...
6	1	2	7.1	3	7.1	7.56	9	0			
105	2006	220	1032	36.88	25.34	45.18	29.22	90	6.26	43.1	...
105	2006	220	1034	28.63	25.53	45.08	29.15	90.1	6.25	44.1	...
105	2006	220	1036	27.75	25.76	45.05	29.11	92.5	6.39	43.1	...
105	2006	220	1038	15.38	25.83	45.05	29.11	93.3	6.44	43.1	...
99	2006	220	1039	17.38	5407	0	99	0			...
160	2006	220	1058	29.25	25.45	45.11	29.16	93.3	6.48	44.1	...
60	2006	220	1100	25.58	54.71	744	1016	5.668	357.7	0	

Figure 2-6 Example data file imported into Microsoft Excel®

60	2006	220	1000	24.87	61.16	602.4	1016	5.542	0.68	0	13.76	0	1
60	2006	220	1100	25.58	54.71	744	1016	5.668	357.7	0	13.46	0	1
60	2006	220	1200	26.12	49.13	817	1016	4.021	356.8	0	13.45	0	1
60	2006	220	1300	26.73	44.6	760	1016	4.254	332.2	0	13.57	0	1

Figure 2-7 Example data file filtered for hourly MET data (Array 60)

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Equipment Staging – Sonde & Platform

3.1 Introduction

In this section and the following section you will configure your sonde to insure proper operation with the CR10X data logger, assemble components and connect cables (as required), and manually verify operation of the Winch Assembly. In Section 4 you will establish communication between LoggerNet™ and the CR10X and download your Profile Wizard file with the profiling instructions.

You should proceed through the above mentioned steps in a stable environment if possible. If you configure and test your profiling system in this manner, you are less likely to make an error that would cost you valuable time once in the field.

3.2 Setting Sonde Parameters

The Campbell Scientific CR10X data logger program relies heavily on information obtained from the YSI sonde both prior to the start of a profile, and during a profile sequence. Therefore, it is imperative that you configure the YSI sonde correctly for successful winch operation. In this section you will learn how to check for key settings in the sonde. These settings apply primarily to proper configuration of the Profiler system. If required consult your YSI 6-series sonde operations manual for more detailed information.

WARNING!

Do not disconnect the sonde from Profiler while it is actively running a profile sequence. Wait for it to finish, or if necessary, disconnect power to Profiler.

You can access the sonde menu using any terminal emulator program, or if available the YSI 650 MDS handheld monitor. One such terminal emulator program is YSI EcoWatch™. Common to most Windows-based computers is Microsoft® HyperTerminal. **If you use the YSI 650 make certain that you ‘escape’ all of the way out of the Sonde menu before disconnecting the YSI 650 from the sonde.**

A YSI sonde field cable is needed for connection to the YSI 650 MDS. A RS-232 cable with MS-8 connector will be needed to connect from your PC COM port to the YSI sonde (YSI Part # 6067). An adapter may be needed, and in some cases a power supply if the sonde is not powered by batteries. Refer to your 6-series sonde manual for cable connection details.

In the example below, a terminal emulator connection is described. Once you establish a connection with the sonde you should see the # sign. You may type ‘ver’ <ENTER> to display the version number of the sonde software; and in a similar manner, Esc to # and type ‘reset’ <ENTER> to display more detailed information about the sonde model and version number. Refer to the displays below. Your sonde version number must be 2.25 or higher.

```
# ver
2.25

# reset
OK
YSI Water Quality Systems Model 6600
Version 2.25 07-01-2004 15:00:58
Copyright (c) 1992-2003 YSI Incorporated.
All rights reserved.
```

At the same # prompt type 'MENU' <ENTER> to access the sonde menu. You should now see the Main menu.

```
-----Main-----
1-Run              5-System
2-Calibrate        6-Report
3-File             7-Sensor
4-Status           8-Advanced
```

To navigate the menus, type '0' or "Esc" to move back to previous levels, or type the number of the submenu you desire to enter. In this section you will want to check, and possibly change, settings in the Advanced, Sensor, Report, System and Status submenus. The displays below lead you through the exercise of accessing each of these menus to check settings. Relevant comments along the way should help you prepare your sonde for connection to Profiler.

First, check Sensor by typing in '7'. Remember that you may need up to twelve (12) sensors in your setup. This depends on your sonde model and your profile. Sensors that are enabled have an asterisk to their left. Verify that these are the measurement sensors that you need for your profile routine. To enable or disable a sensor, type the character to the left of the name (1-9, A-J), making certain that an asterisk appears if you want that sensor enabled.

Under the sensor menu Time may be enabled. However, in the Report menu, time and date must be disabled to work with YSI Profiler. See more information below. Note also that the Pressure sensor is present and enabled. This is the sensor that is used in measuring depth. A depth sensor is required in the YSI Profiler application. Now type '0' to return to the Main menu.

```
-----Main-----
1-Run              5-System
2-Calibrate        6-Report
3-File             7-Sensor
4-Status           8-Advanced
```

Next, select 6-Report to view the parameters, including the units of measurement that you have chosen. Make note of the three highlighted parameters. In the setup of the profiling routine, both date and time must be disabled. In addition, Depth in meters must be enabled. Profiler software does not calculate properly when depth is set in feet. Double-check to make certain that you have set these parameters as required. Now take a look at other parameters that are enabled to be reported. Are these the parameters that you have chosen for your profiling routine? If not, now is the time to change them. There is a maximum of twelve (12) parameters for display and depth must be one of them. Another useful parameter to report is Battery volts.

Since you depend on power to the sonde for proper calibration and measurements in the field, we recommend this in the report choices.

```
-----Report setup-----
1-( )Date           B-(*)DOchrg
2-( )Time hh:mm:ss  C-( )Press psig
3-(*)Temp C         D-(*)Depth meters
4-(*)SpCond mS/cm   E-(*)pH
5-(*)Cond mS/cm     F-(*)pH mV
6-( )Resist         G-(*)Turbid+ NTU
7-( )TDS            H-(*)Chl ug/L
8-(*)Sal ppt        I-(*)Fluor %FS
9-( )DOSat %        J-(*)Battery volts
A-(*)DO mg/L
```

Next, type '0' to return to the Main menu, and then select 5-System to check on the SDI-12 address. The sonde SDI-12 address must be set to 0 in order to communicate with the Profiler.

```
-----Main-----
1-Run              5-System
2-Calibrate        6-Report
3-File             7-Sensor
4-Status           8-Advanced
```

```
-----System setup-----
1-Date & time
2-Comm setup
3-Page length=25
4-Instrument ID=99F0932 AA
5-Circuit board SN:0001066E
6-GLP filename=0001066E
7-SDI-12 address=0
8-Language:English
```

While you are in System menu, check 2-Comm setup to make certain that the parameters Auto baud and 9600 baud rate are enabled. Once you verify this, type '0' two times to back out to the Main menu.

```
-----Comm setup-----
1-(*)Auto baud      5-( )2400 baud
2-( )300 baud       6-( )4800 baud
3-( )600 baud       7-(*)9600 baud
4-( )1200 baud      8-( )19200 baud
```

```
-----Main-----  
1-Run           5-System  
2-Calibrate     6-Report  
3-File          7-Sensor  
4-Status        8-Advanced
```

Next, select 4-Status to make certain that the sonde is not set for logging. Item number seven should read Logging: Inactive. Check your sonde manual for details on turning off the logging activity, or see below during the final sonde menu checks. Normally the active logging parameter would not be set.

```
-----Status-----  
1-Version:2.25  
2-Date=11/17/05  
3-Time=16:24:36  
4-Bat volts:12.3  
5-Bat life 20.0 days  
6-Free bytes:295424  
7-Logging:Inactive
```

Note that battery voltage for the sonde is 12.3 volts and has an expected battery life of more than 20 days based on parameters that are set. Although you see Date and Time in this screen, this does not necessarily mean that Report setup has date and time enabled. You confirmed that these parameters were turned off when you displayed the Report setup menu above.

Next, type 0 to return to Main menu.

```
-----Main-----  
1-Run           5-System  
2-Calibrate     6-Report  
3-File          7-Sensor  
4-Status        8-Advanced
```

Type 8-Advanced, to view a submenu that takes you into a variety of settings from calibration constants to timing of activities. In addition to checking some of the timing settings, it is important to verify that the Auto sleep function is enabled. This is one of the requirements of monitoring in the Profiler routine.

```
-----Advanced-----  
1-Cal constants  
2-Setup  
3-Sensor  
4-Data filter
```

```
-----Advanced setup-----  
1-(*)VT100 emulation  
2-( )Power up to Menu  
3-( )Power up to Run  
4-( )Comma radix  
5-(*)Auto sleep RS232  
6-(*)Auto sleep SDI12  
7-( )Multi SDI12  
8-( )Full SDI12
```

Note that both RS232 and SDI12 Auto sleep functions are enabled. If not, change these settings by typing the number of the function to toggle on or off the asterisk. Next, return to the Advanced menu and then type 3-Sensor.

```
-----Advanced-----  
1-Cal constants  
2-Setup  
3-Sensor  
4-Data filter
```

Note in the Advanced sensor screen below that DO warm up time is set to 60 seconds, which is the appropriate setting for the profiling routine. Since there are sensors with wiping mechanisms in this sonde, keep in mind that the SDI12-M/wipe=1 means that the sensor will wipe before each reading (turbidity or chlorophyll). If you set this number to two (2), a wipe will occur before every other measurement. Choose the number appropriate for your water conditions.

```
-----Advanced sensor-----  
1-TDS constant=0.65  
2-Latitude=40  
3-Altitude Ft=0  
4-DO temp co %/C=1.1  
5-DO warm up sec=60  
6-( )Wait for DO  
7-Wipes=1  
8-Wipe interval=5  
9-SDI12-M/wipe=1  
A-Turb-6136 temp co %/C=0.6  
B-(*)Turb-6136 spike filter  
C-Chl temp co %/C=0
```

Next, make a quick check of other Advanced settings, specifically Data filter Cal and constants. Type '0' to return to Advanced.

```
-----Advanced-----  
1-Cal constants  
2-Setup  
3-Sensor  
4-Data filter
```

Select 4-Data filter, then select 3-Time constant... The time constants should resemble those shown below for Turbidity and Chlorophyll sensors at 12 seconds, while Other defaults to 4 seconds.

```
-----Data filter setup-----  
1-(*)Enabled  
2-( )Wait for filter  
3-Time constant...  
4-Threshold...
```

```
-----Time constant-----  
1-Turbid=12  
2-Chl=12  
3-Other=4
```

Return to Data filter setup and select 4-Threshold...

```
-----Data filter setup-----  
1-(*)Enabled  
2-( )Wait for filter  
3-Time constant...  
4-Threshold...
```

```
-----Threshold-----  
1-Turbid=0.01  
2-Chl=1  
3-Other=0.001
```

The above readings are typical and appropriate for the profiling routine. Please see the sonde manual for additional information on this and other advanced settings. Next, type '0' two times to return to the Advanced menu.

```
-----Advanced-----  
1-Cal constants  
2-Setup  
3-Sensor  
4-Data filter
```

Cal constants are shown in the next screen. For the sensors enabled the constants should appear similar in value to those seen in this screen.

```
-----Cal constants-----  
1-Cond:4.99584  
2-DO gain:1.01064  
3-Pressure offset PSI:0.011  
4-pH offset (pH-7)*K:19.7162  
5-pH gain (pH-7)*K/mV:-5.12062  
6-Turb-6136 Offset:7.01061  
7-Turb-6136 A1:122.378  
8-Turb-6136 M1:125.241  
9-Turb-6136 A2:244.757  
A-Turb-6136 M2:250.482  
B-Chl Offset:-1.88556  
C-Chl A1:100  
D-Chl M1:69.9475  
E-Chl A2:200  
F-Chl M2:139.895  
G-Fluor Offset:-0.44621
```

Type '0' to back out to the Main menu.

```
-----Main-----  
1-Run  
2-Calibrate  
3-File  
4-Status  
5-System  
6-Report  
7-Sensor  
8-Advanced
```

Now type 1-Run to view the Run setup options and then type 1-Discrete sample.

```
-----Run setup-----  
1-Discrete sample  
2-Unattended sample
```

When you type 1-Start sampling you will now be able to view data from sonde sensor measurements. Evaluate your data based on where the sonde resides at this time (air, bucket, environmental water). Regardless of readings you can confirm that all sensors are working and the sonde is actively measuring parameters in the correct units.

```
-----Discrete sample-----  
1-Start sampling  
2-Sample interval=0.5  
3-File=  
4-Site=  
5-Open a file
```

Several lines of results are shown in the screen below.

=====												
Temp	SpCond	Cond	Sal	DO	DOchrg	Depth	pH	pH	Turbid+	Chl	Fluor	Battery
C	mS/cm	mS/cm	ppt	mg/L		meters		mV	NTU	ug/L	%FS	volts

*** 1-LOG last sample			2-LOG ON/OFF, 3-Clean optics ***									
Stabilizing:4 3 2 1												
16.93	0.001	0.001	0.00	8.35	53.2	0.000	1.77	300.2	428.2	0.2	0.0	12.3
16.92	0.001	0.001	0.00	8.35	53.1	0.000	2.04	284.9	428.2	0.2	0.0	12.3
16.91	0.001	0.001	0.00	8.36	53.2	0.000	2.19	276.4	428.2	0.2	0.0	12.3
16.91	0.001	0.001	0.00	8.36	53.1	0.000	2.36	266.9	428.1	0.2	0.0	12.3
16.91	0.001	0.001	0.00	8.36	53.2	0.000	2.47	260.7	428.1	0.2	0.0	12.3
16.91	0.001	0.001	0.00	8.36	53.2	0.000	2.56	255.6	428.1	0.2	0.0	12.3

Type 2-Stop sampling to discontinue sampling data, then type '0' several times until you return to Main menu, and then finally to the # sign. You have now exited the sonde menu and you may now disconnect the sonde from the cable to the PC.

-----Main-----	
1-Run	5-System
2-Calibrate	6-Report
3-File	7-Sensor
4-Status	8-Advanced

#

You have now completed checking the YSI sonde for proper configuration. In addition, you have become generally familiar with all submenus in the sonde Main menu. If you have yet to calibrate the sonde, refer to your sonde user manual and use the 2-Calibrate function to enter the submenus to complete this operation.



Once calibration setup is complete ensure the sonde has new batteries installed and the sensor guard has the provided standard weight attached. The top of the weight, inside the sensor guard, should be painted black to ensure proper operation of the optical sensors. Refer to Figure 3.1.

Figure 3-1 Sonde Sensor Guard with standard weight

NOTE:

Sonde must be equipped with provided sonde weight for the YSI Profile system to work properly.

3.3 Connecting and Checking Profiler Components

The YSI Profiler Platform block diagram in Figure 3-1 depicts the major components in the system. Except for the PC, all components are located on the floating platform. In gray boxes are the Controller components, in addition to communication and power devices. These are all located within the waterproof PVC cylindrical housing.

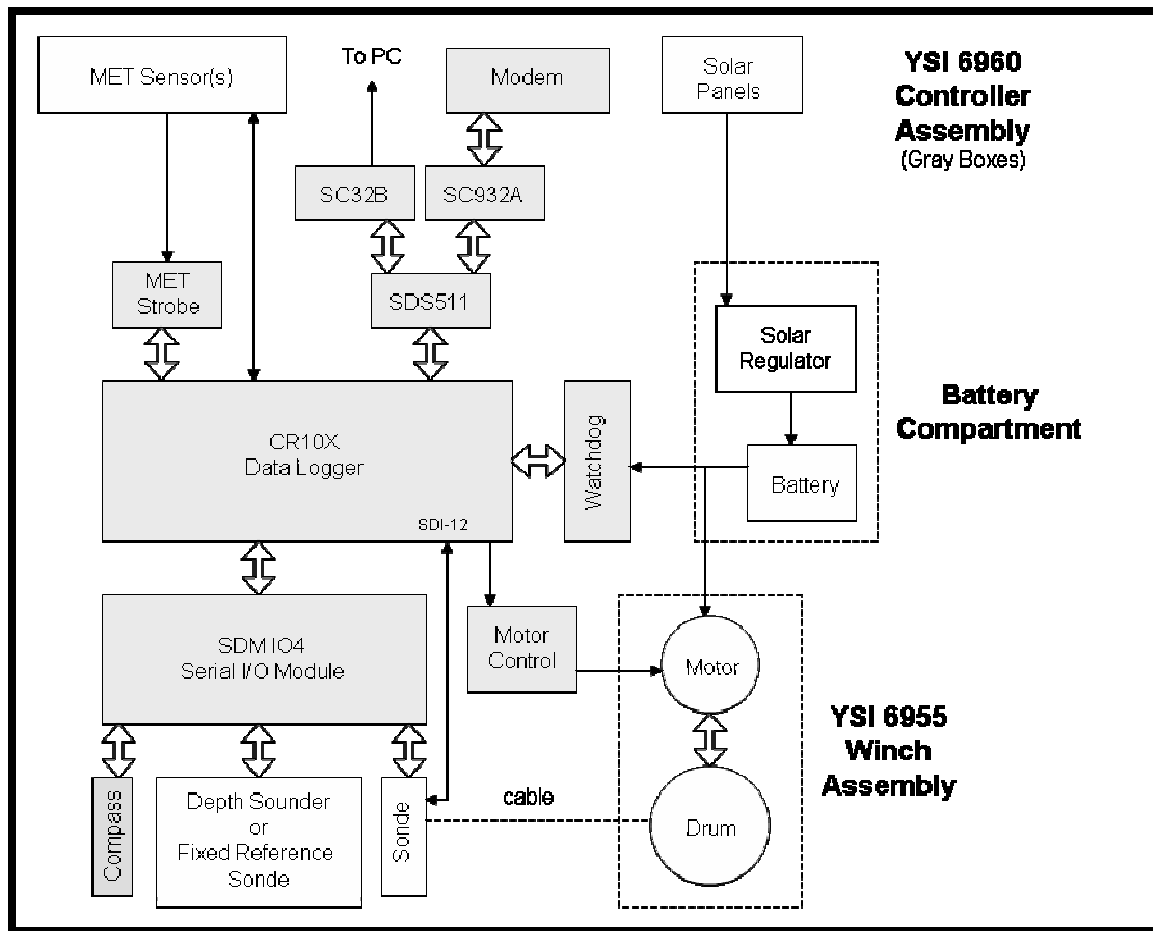


Figure 3-2 Block Diagram – YSI Profiler System

Now refer to the figures on the next several pages. The Winch Assembly, including drive motor, is mounted on the bow side of the T-frame, while the Controller Assembly is mounted on the stern side of the T-frame (See Figures 3-2, 3-3, 3-4). The battery and solar regulator are housed in a separate waterproof compartment on the stern side of the float deck, just below the Controller (Figure 3-6). Meteorological sensors, antenna, beacons and miscellaneous devices may be mounted elsewhere on the platform, as determined by the configuration that you ordered. The solar panels are mounted on both bow and stern faces of the two covers that protect all of the assemblies (See Figure 3-9).

See Figure 3-2 below for a photograph of the floating platform during final assembling and pre-deployment testing.



Figure 3-3 YSI Profiler Platform inside during Pre-Deployment Checkout



Figure 3-4 Winch Assembly mounted to T-frame; Winch motor to right of drum

The sonde cable from the controller connects to the drum on the left side in Figure 3-3 (not visible in photo); while the winch motor/gear assembly is mounted to the right side. The orange sonde cable routes through the opening in the deck. A diamond screw helps guide cable to wind evenly on the drum. The cable passes through a V-roller suspension assembly that helps to prevent possible snags or tangles as the sonde pays out or reels in during profiling.



Figure 3-5 PVC Electronics Housing, correct orientation

The mounting orientation of the pressure case is critical when an internal compass is installed. Figure 3-4 shows the correct orientation with the magnetic switch located at 11 O'Clock when looking at the faceplate. Another easy orientation check is to make sure the antenna connector (see white cap in Figure 3-4) is the closest connector to the T-Frame back plate. A secondary benefit to this orientation is that the internal modem lights (if installed) will be perpendicular to the deck for easy viewing (back side of housing).

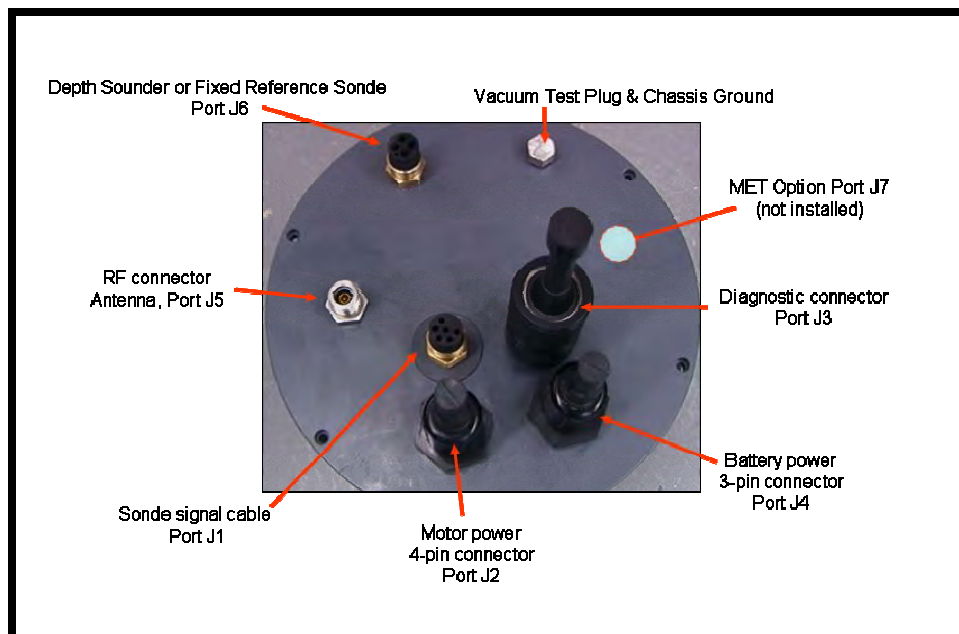


Figure 3-6 PVC Electronic Housing; Port Locations¹

The T-frame Assembly should arrive largely assembled. You and/or your YSI representative will need to mount the T-frame to the float deck. The Winch Assembly faces the bow of the

¹ Port J6 in Fig 3-5. A second sonde connector may appear on this housing if a fixed reference sonde (attached sonde) is used to establish depth relative to the bottom of the water column.

float and the motor power cable connects to J2 of the Controller Assembly. The PVC cylindrical housing (Controller Assembly) and the battery enclosure face the stern of the float. Depending on your configuration, there may be several components that were disconnected and packaged for safe shipping. You will need to make these connections to complete the assembly, however, do not connect power to the system until you read the procedure in the next subsection below.

CONNECT POWER TO SYSTEM

Insure that the battery enclosure is secured to the T-frame and then install the battery. Measure the battery voltage and confirm that it is charged. The voltage should be at least 12.0 VDC.

CAUTION!

Observe polarity when making power connections! Red to red. Black to black.

Connect the red and black leads from the Solar regulator (housed inside the battery enclosure) to the battery posts. RED TO RED, and BLACK TO BLACK.

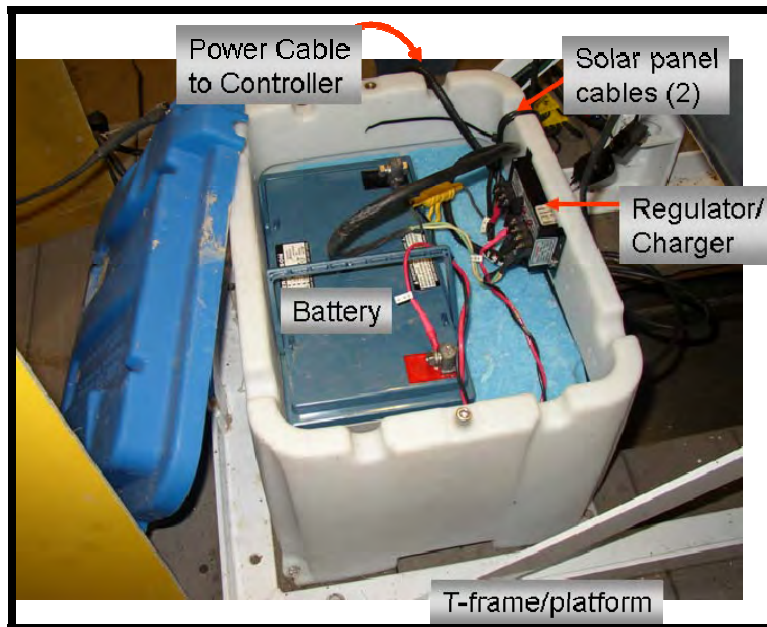


Figure 3-7 Battery and Solar Regulator: Connections

Next connect the Battery power cable to the PVC-housed Controller Assembly, J4 port connector. This is a 3-pin connector. Then connect the Winch motor power cable to the Controller Assembly, J2. This is a 4-pin connector. See Figure 3-7 below.

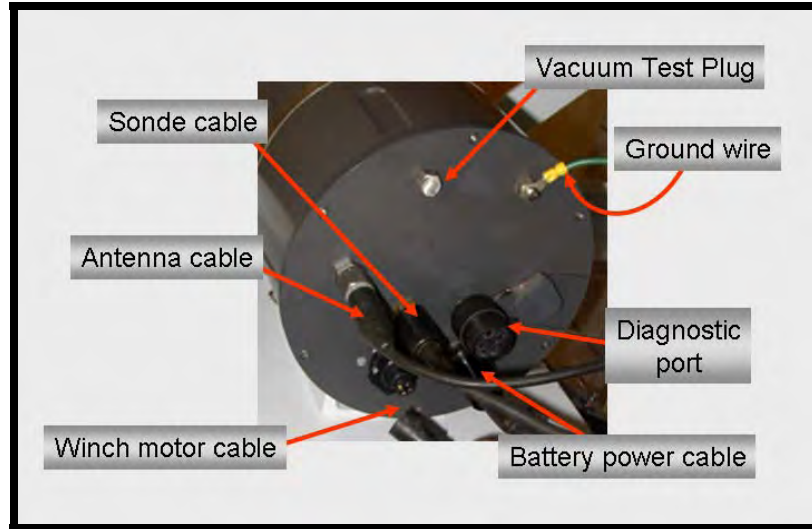


Figure 3-8 Connect Winch Motor Cable to Controller (J2)

VERIFY WINCH OPERATION

First, verify that the motor power cable is connected to J2 of the Controller Assembly. After you make the battery power connection to the controller, use the special magnetic slide switch to test if the winch will pay out and reel in when the switch is activated. Placing the magnet side down in the groove should result in movement of the winch drum. You should hear a click from the relay contacts. The winch drum should move. Next slide the switch in the groove to control direction of the cable movement. The sonde need not be attached for this test. To stop winch movement, pull the magnetic slider away from the groove. This manual test verifies winch movement. If the winch does not behave as described above, check all connections, check battery voltage and repeat the procedure.

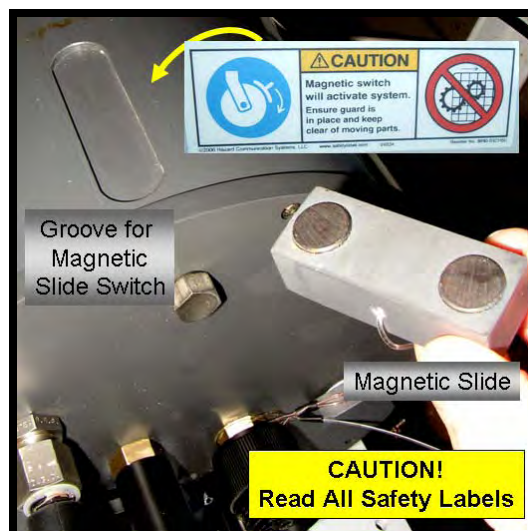


Figure 3-9 Magnetic Slide Switch to Test Winch System



Figure 3-10 Housing with Solar Panel (one of two that mounts to T-frame)

CHECKING & Connecting OTHER COMPONENTS

SONDE

If you do not have the YSI sonde prior to receiving the YSI Profiler System, you will receive your sonde separately. The YSI sonde pre-deployment configuration was described in Section 3.2, Setting Sonde Parameters. If not yet configured, you can easily check it with the YSI 650 MDS. Alternatively, you may use a PC and terminal emulator program as described in the previous section. *IMPORTANT: The sonde must be configured to work with the Profiler.* If you skipped the configuration steps, take time to read Section 3.2



Figure 3-11 Checking Sonde Configuration during Equipment Staging

ANTENNA

The antenna will typically be shipped with the Profiler T-frame assembly. The antenna cable will already be connected to the Controller System, Port J5 as shown in Figure 3-5. Unpack and reattach the antenna base to the top plate of the T-frame. Mounting holes and hardware are included.

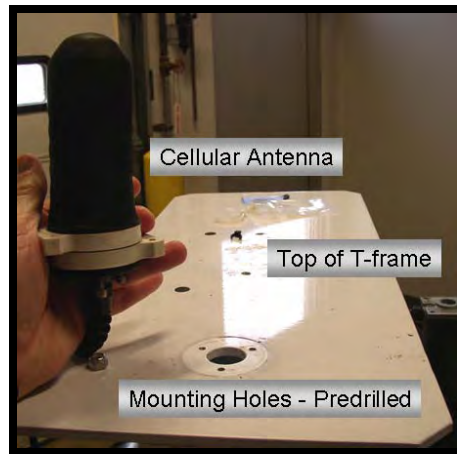


Figure 3-12 Remounting the Cellular Antenna during Equipment Staging

DEPTH SOUNDER (optional)

The Depth Sounder is a sensor that periodically confirms water depth as directed by the profiling program downloaded to the Campbell CR10X data logger. The sensor unit, if ordered, will be mounted to the platform deck and the cable will be plugged into Port J6 on the Controller Assembly (PVC cylindrical enclosure). Check to make certain the sensor unit is securely fastened and the cable is appropriately routed and connected.

METEOROLOGICAL SENSORS (optional)

Some or the entire MET suite of sensors may be mounted to your Profiler System. Check that the sensors you ordered are present and mounted. Some sensor units will need to be remounted if they were separately packed for shipping. The MET suite cabling will typically require a PVC breakout box to connect cables from separate units. One cable then plugs into Port J7 (installed as needed) of the Controller Assembly. The cabling should be in place. Insure secure mounting of sensor units and proper routing and connection of all cables. Live testing will be described prior to final deployment.

Unless you have additional options for your Profiler platform, such as beacons or other optional equipment, the indoor staging procedure is complete. The next step will be to setup and connect the CR10X in the Controller Assembly via direct and/or wireless connection using the LoggerNet™ software.

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Section 4

Equipment Staging – PC / CR10X Communication

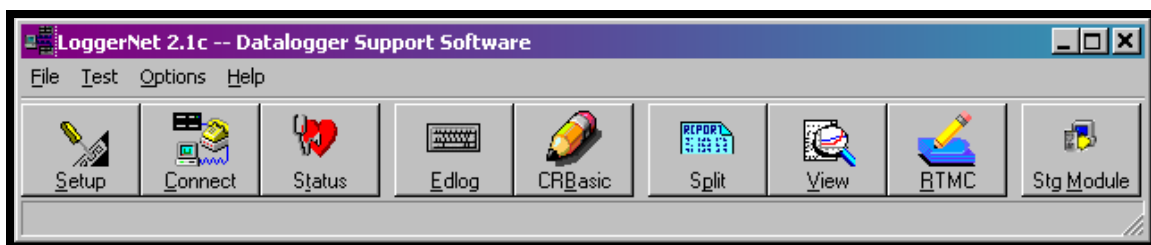
4.1 Introduction

You will now open LoggerNet™ and set up a connection between your PC and the CR10X data logger. You will also set up your modem. Finally, you will proceed to download the program (*.dld) that you created with YSI Profile Wizard. Communication with the CR10X will allow you to perform important pre-deployment tests before locating the Profiler at a monitoring site. To connect your PC to the CR10X (housed within the Profiler Controller Assembly) you will need a Diagnostic Cable (provided with your system). One end is a 9-pin standard RS-232 connector; the other connector fits the Diagnostics port (J3) of the Controller. In addition, you will learn to use LoggerNet™ to set up modem communication using the Setup function. The most commonly used means of wireless communications in this system are either a cellular modem or an IP address. Refer to your LoggerNet manual for detailed instructions. Below you will see a sample setup.

You should proceed through the above mentioned steps in a stable environment if possible. If you configure and test your profiling system in this manner, you are less likely to make an error that would cost you valuable time once in the field.

4.2 Setting Up Communication from PC to Station (CR10X)

Use this section in conjunction with the LoggerNet™ manual. After installation, LoggerNet™ will appear in the Programs folder of the Start Menu or as an icon on Windows Desktop. Double click the LoggerNet™ icon to open the following window.

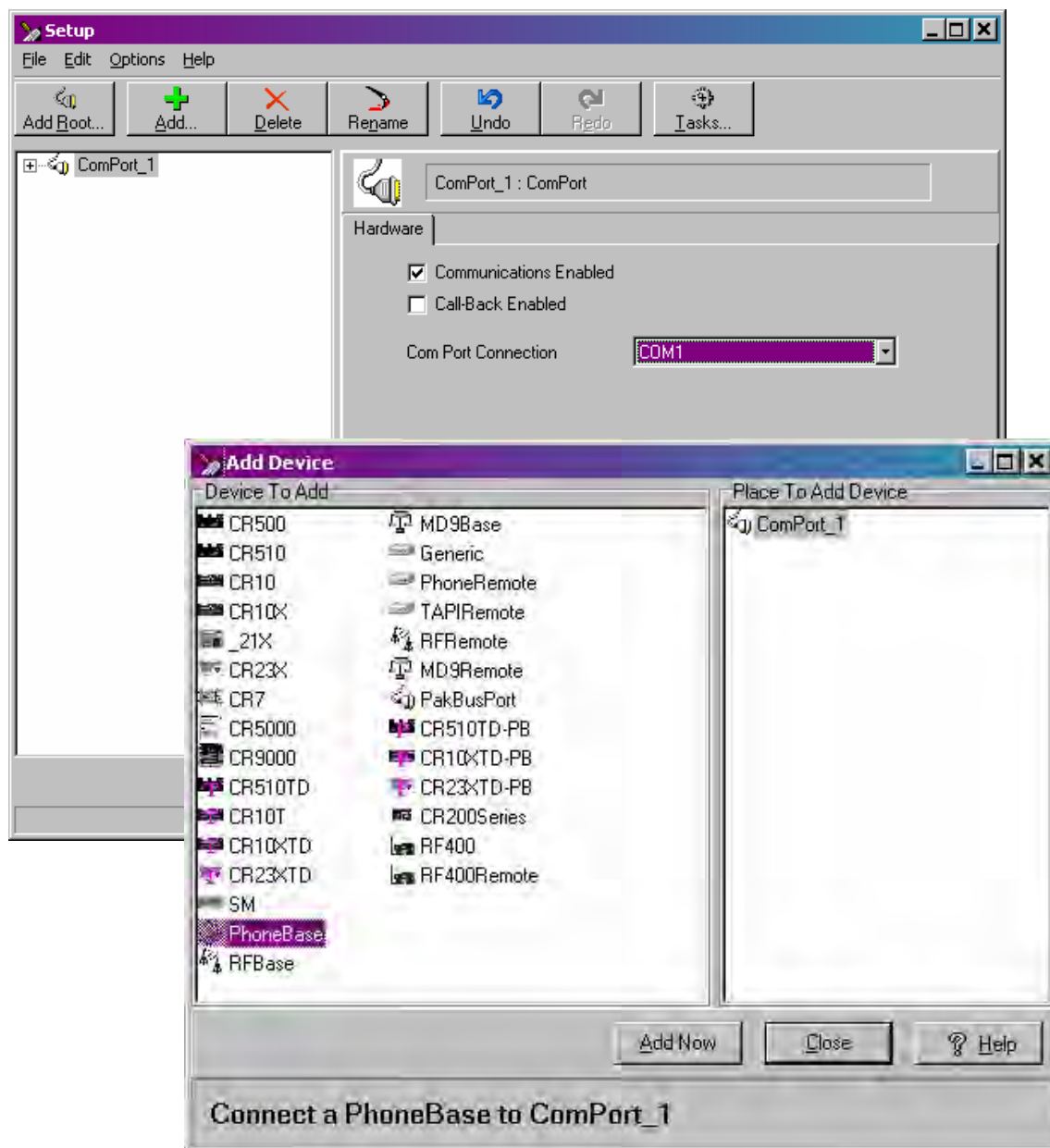


Click Setup (far left button above) to open the Setup screen shown below. At any time you may click the Undo button to reverse changes you have made.

Now proceed with the setup.

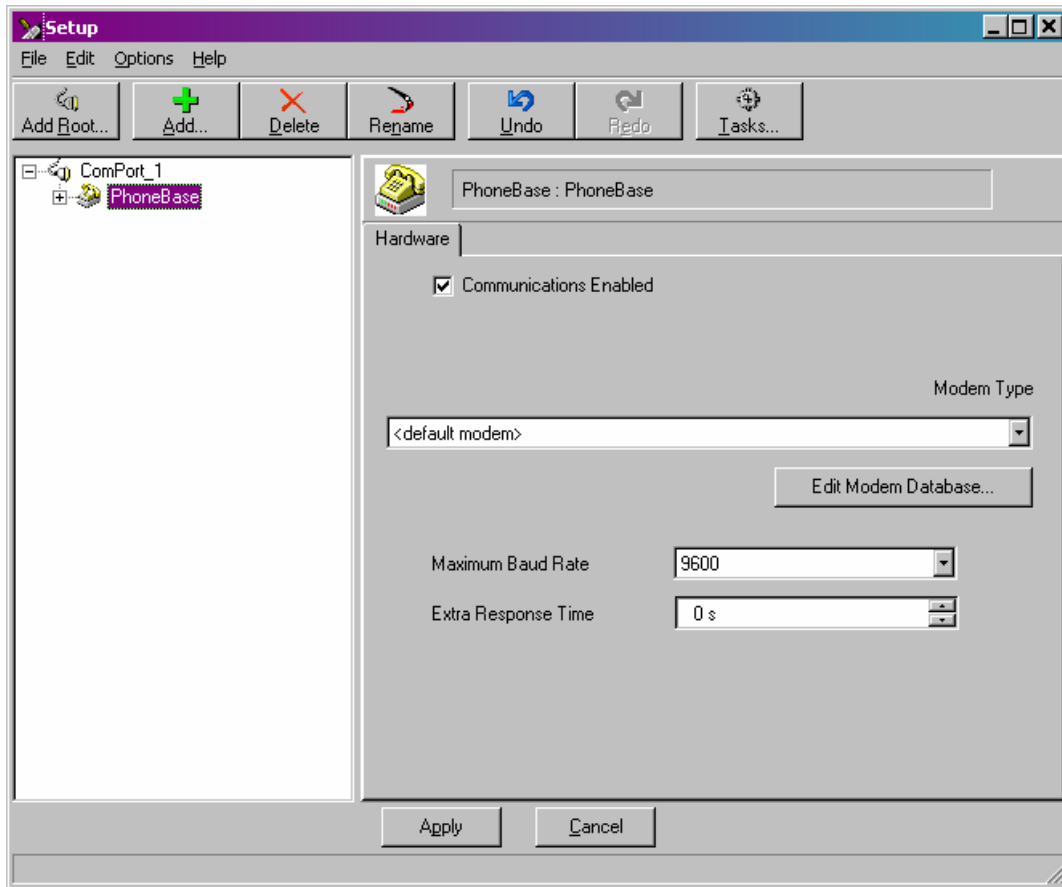
SET UP MODEM CONNECTION

Use the Add Root... button and the Add... button on the Setup screen to 'build' a communications tree in the left field of the screen. As you see below you begin with ComPort_1. Highlight the port, click on Add... (green plus sign) to show the Add Device screen, and then click on a device (PhoneBase). Click on Add Now... and the 'tree grows'. You just established the first link in the communications setup. Notice at the bottom of the screen it reads 'Connect a PhoneBase to ComPort_1'.



If multiple ComPorts are shown under Place to Add Device (right field on screen), then click the port location you prefer before clicking Add Now. Click the Close button.

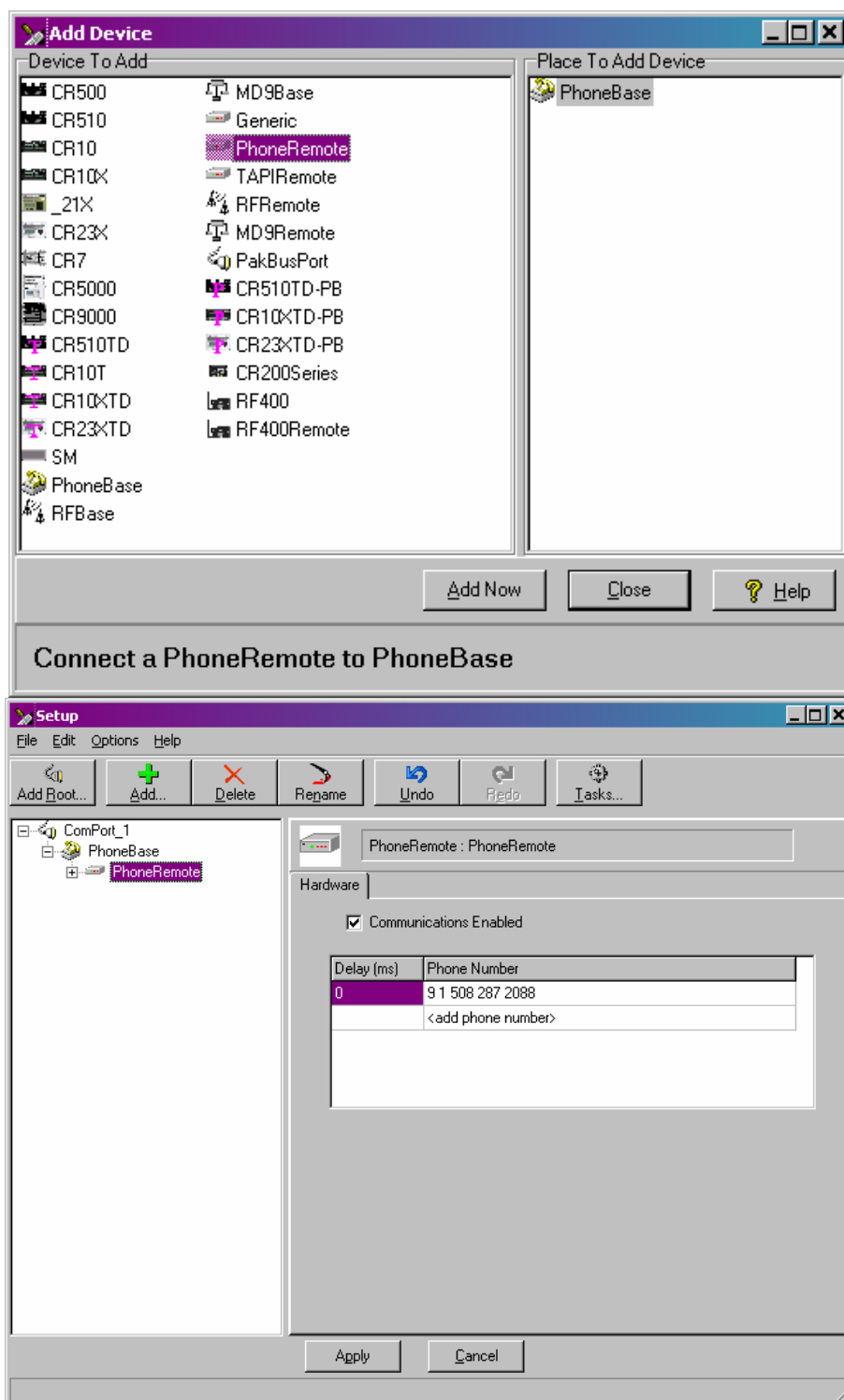
The Setup screen now appears as shown below. It shows PhoneBase under ComPort_1 in the left field (see tree diagram on next page). The software will automatically select Modem Type to be <default modem>. Click the down arrow to the right of the field to change modems as appropriate for your system.



Ensure that Communications Enabled is checked. To edit the modems available, click the **Edit Modem Database....** button. Set the Maximum Baud Rate to 9600 and the Extra Response Time to 5 sec. Click **Apply** to confirm any changes.

Now, click to highlight PhoneBase in the left field (tree) and click the **Add...** button just as before to proceed with your setup.

Now highlight PhoneRemote. Note that PhoneBase is now in the 'Place to Add Device'. Click the **Add Now...** button and then click **Close** to complete this step. Enter the Delay¹ (ms) and the appropriate phone number for your connection, then click on the **Apply...** button.

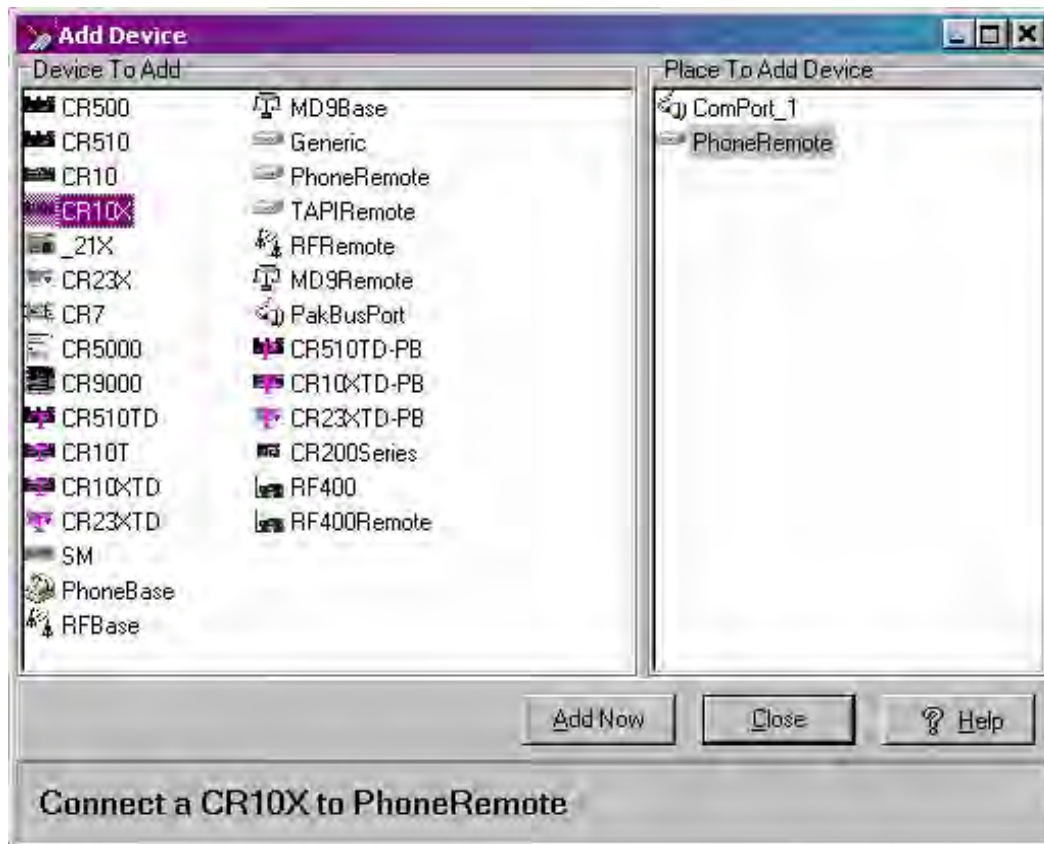


¹ 5 ms is an appropriate delay time for the YSI Profiler system

The final step is to connect the PhoneBase to the CR10X device listed in the pop-up screen. As before, with PhoneBase highlighted, click on Add... (green plus sign) to complete the tree for modem communications.

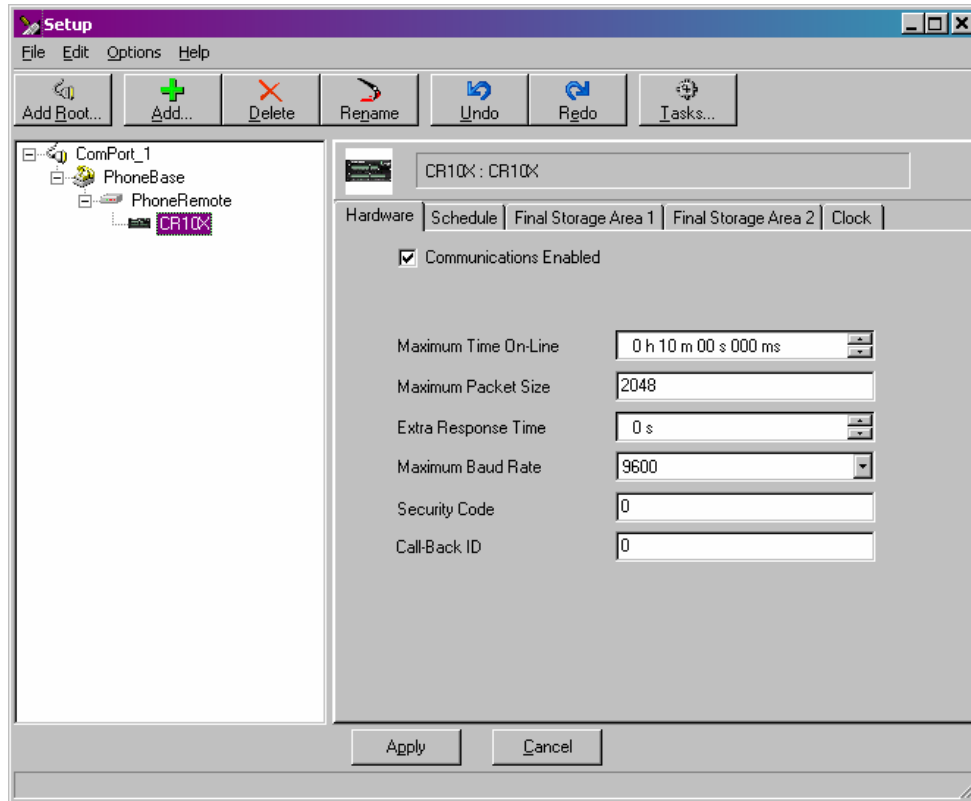
IMPORTANT:

Only one CR10X can be assigned to a PhoneRemote at a given time.

**NOTE:**

In the screen above, both ComPort_1 and PhoneRemote are choices to add the CR10X. For direct line communications this is an option with a Diagnostics Cable.

As you can see in the screen below you now have a path from PC to data logger represented by a tree. Next you will enter or confirm some timing information.



Under the Hardware tab, ensure that Communications Enabled is checked.

Adjust the Maximum Time On-line and Extra Response Time to the desired interval (10 minutes ON; 0 sec Extra).

Set the default Maximum Packet Size to 2048, and the Maximum Baud Rate to 9600.

More information regarding the Security Code and Call-Back ID can be found in the LoggerNet user manual. Click the Apply to confirm changes.

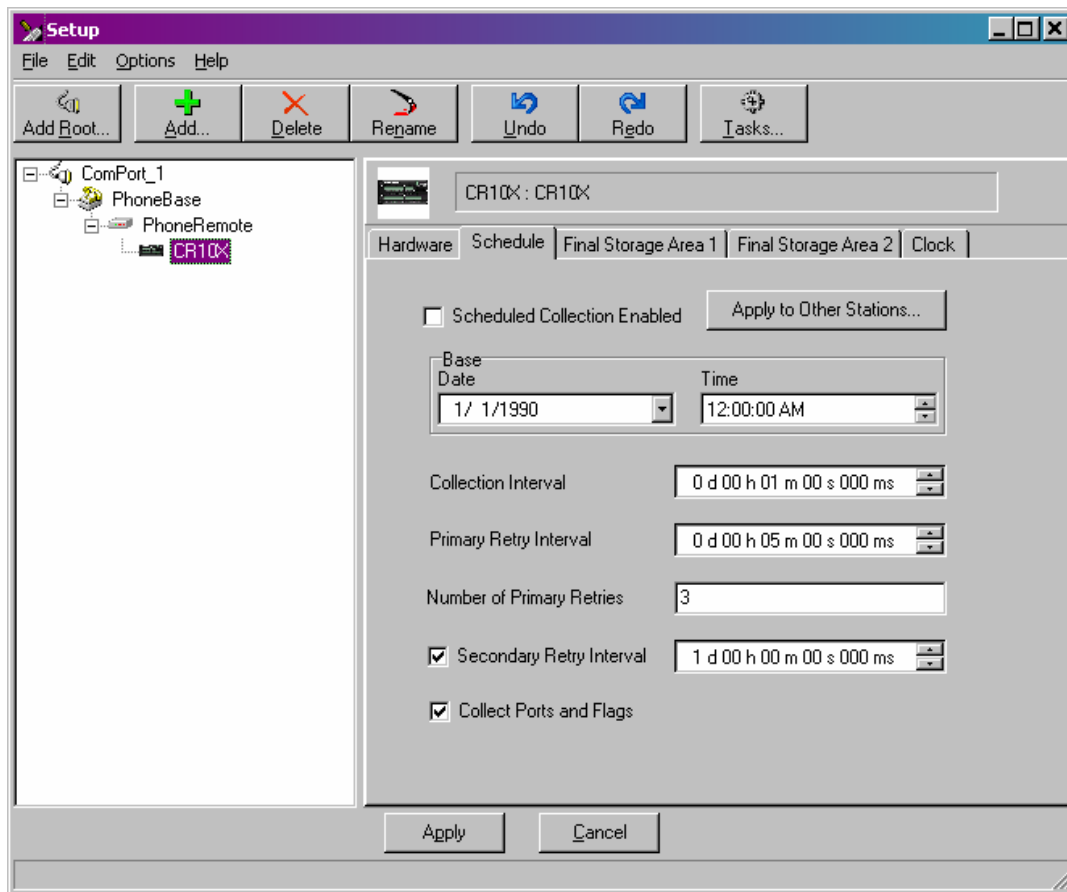
You are now ready to move to the Schedule tab to enter information on collection intervals, retries and related scheduling parameters. Your left field tree should remain with CR10X highlighted. It is customary to rename 'CR10X' to something that helps you identify this field station. Use the **Rename** button or simply highlight the box and rename your station.

Although unchecked in the screen below, you would check the Scheduled Collection Enabled box to set up automated data collection.

When using scheduled collection, set the Base Date & Time, Collection Interval, Primary Retry Interval, and Number of Primary Retries (defaults shown below of one minute collection interval, 5 minutes on retry interval, and 3 retries).

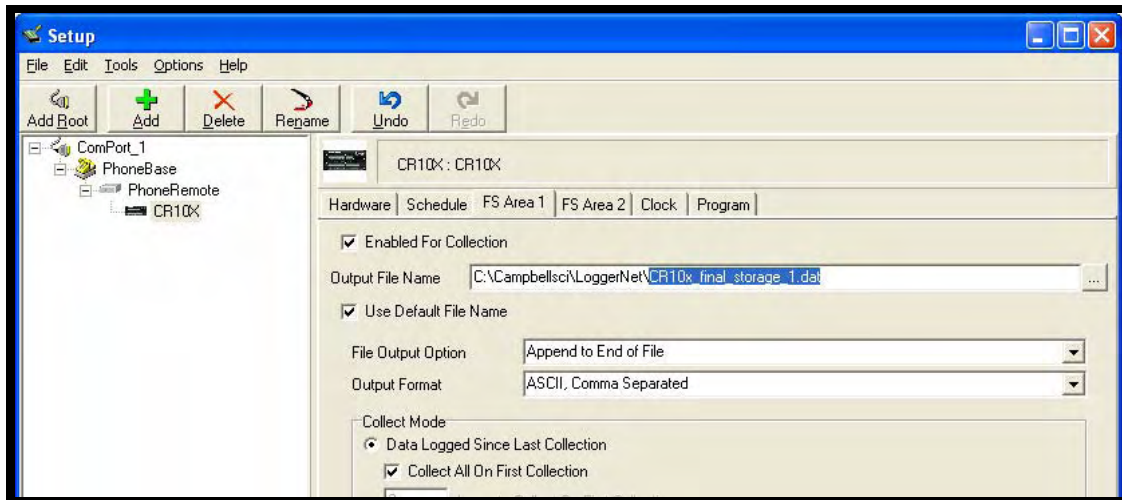
If you choose to use Secondary Retry Interval, check the box and set the interval in the field to the right (1 day in this example).

Now check Collect Ports and Flags. This allows you to collect troubleshooting information. Ports and Flags will be explained in more detail in the next section of this manual. Click **Apply** to confirm changes. If required, click **Apply** to other stations to confirm configurations to any other profilers on the system. In this example, there is just one CR10X.



Under the Final Storage Area 1 (FS Area 1) tab change the Output File Name (and path) from the default value (shown below) to the station filename assigned when the DLD file was created.

In addition, save this new DAT file to the same directory where the DLD file is located. For example, if the station filename assigned during Profile Wizard setup was GSI-lab600.dld, then the final storage filename would be GSI-lab600.dat; and it would be stored in the same directory as the DLD file.



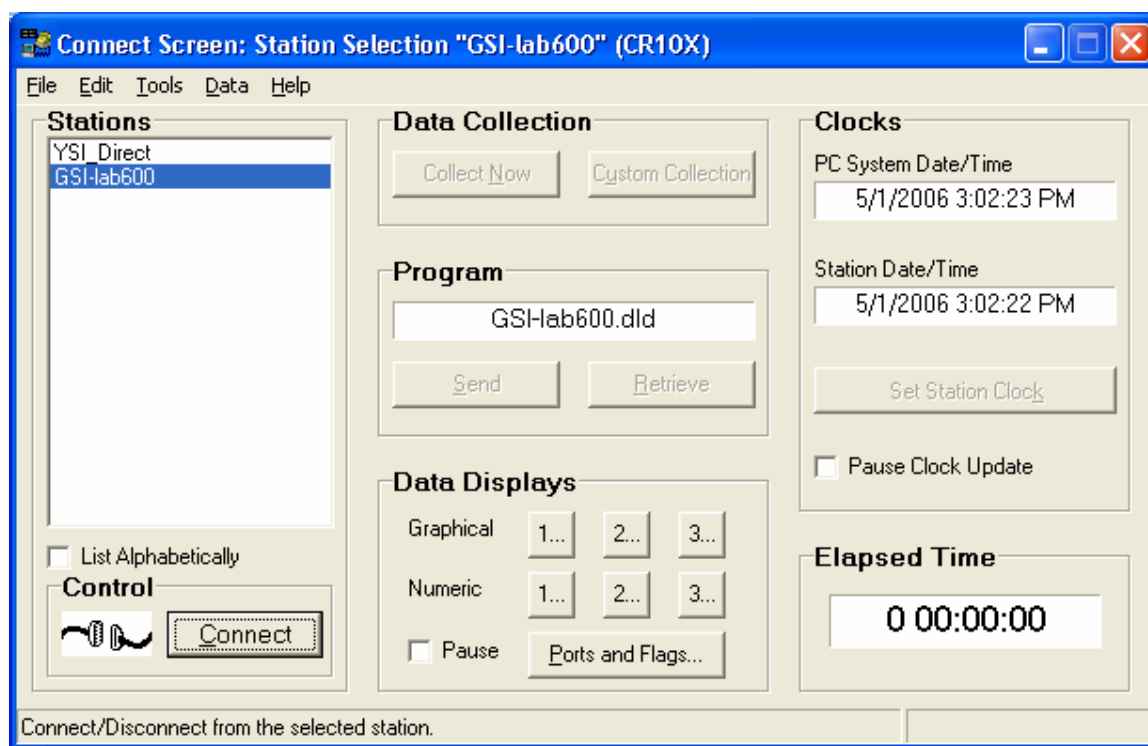
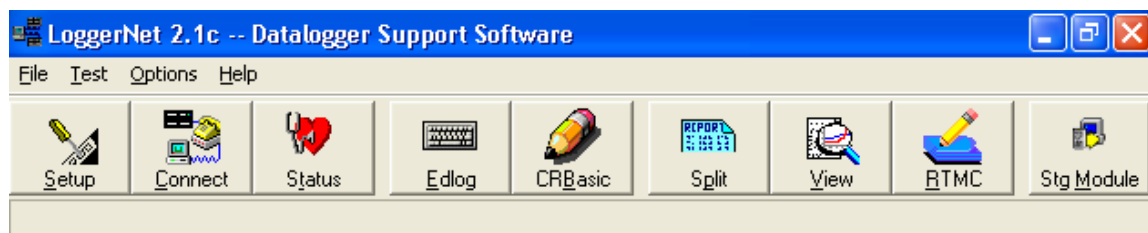
To learn more about information under the tabs Final Storage Area 1, Final Storage Area 2, and Clock you should refer to you LoggerNet user manual.

Once all changes are made, click on the Apply button to confirm changes. After confirming changes, click on the X at the upper right of the window to close the setup screens.

CONNECT PC TO CR10X DATA LOGGER

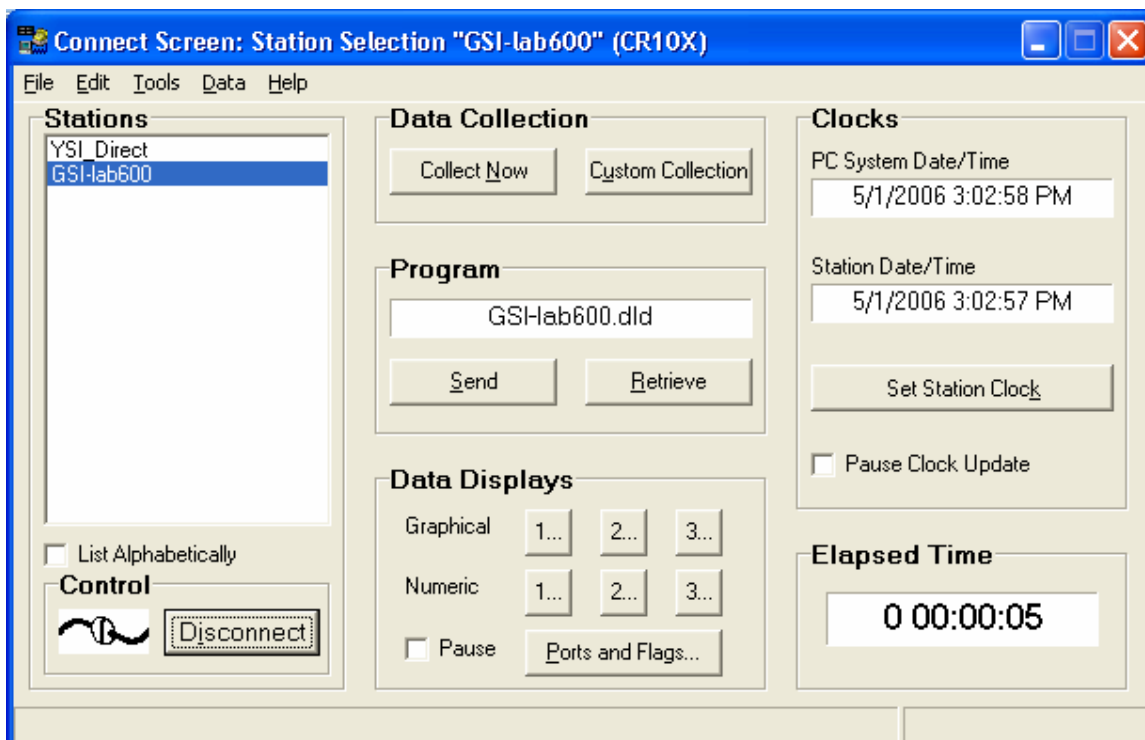
In the example below let us assume that you correctly set your connection path (see above) and the profiling routine that you created with Profile Wizard resides in a directory. The remote station is Clark Reservoir Site 12, which was defined in Section 2 of this manual. You have renamed the CR10X station to be GSI-lab600 and there is a DLD file in the Profile Wizard Shared directory (or site specific folder) by this name. You are able to directly connect ComPort_1 to the data logger by the Diagnostic Cable and you are set to test the remote connection via IP address information that was set in LoggerNet Setup.

Open the LoggerNet™ tool bar window. Click on the Connect button to open the Connect Screen.



Note that GSI-lab600 now appears with YSI Direct as CR10X options in the left field of the screen. Highlight GSI-600lab. Assume the phone base is directed to an active cellular modem or IP address.

Now click the Connect button. The image of 'two cables aligned and ready to connect' appears in the lower left field. A space remains between the two connector images until the communication link is established. Activity begins during dialing and then the connection closes with a successful connection.



The button reading Connect changes to read Disconnect after the connection is completed. Clock time may differ, but you can synchronize the station time to the PC time using the Set Station Clock button.

Note in particular that both the Data Collection and Program buttons are now active. If you have not yet sent your DLD program that defines the profiling routine to the CR10X, then the Send button can be used to do this. If the DLD program has been sent, you may click on the Collect Now button to query the data logger for information and data.

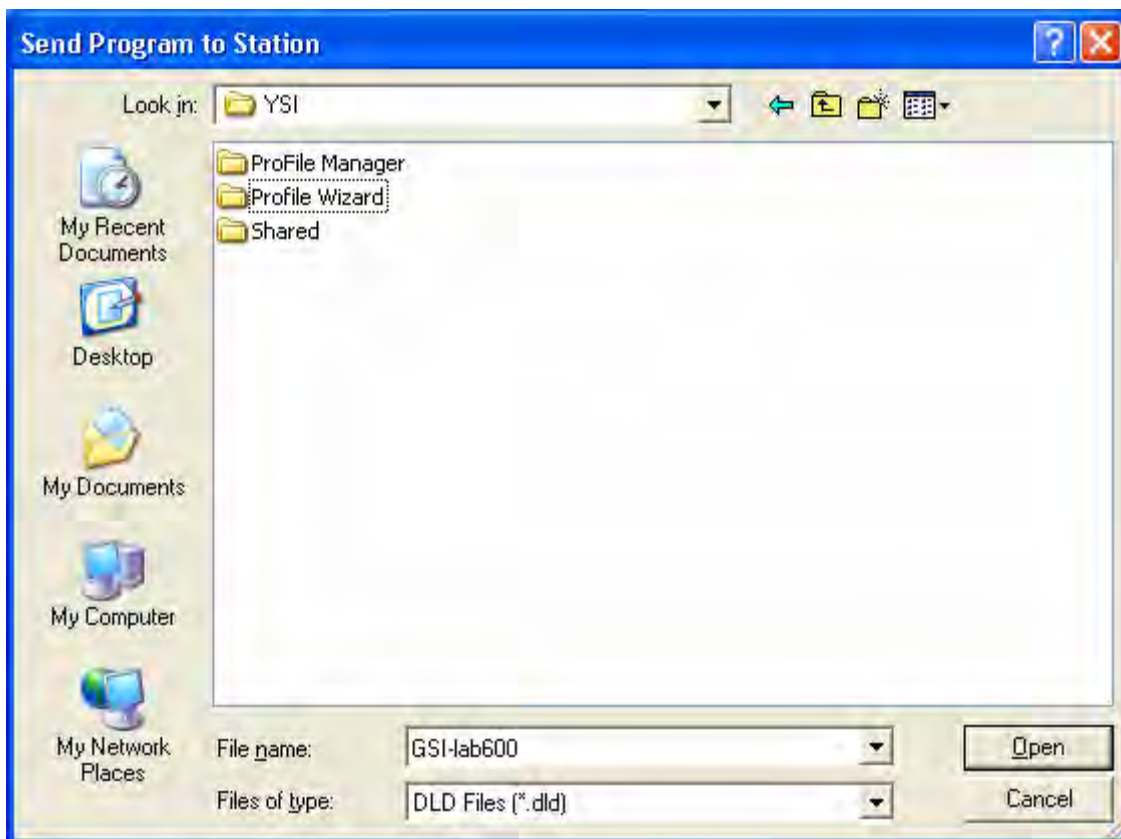
You will learn more about Ports and Flags in the next section of this manual.

Let us assume that you need to send the DLD program to the CR10X. Refer to instructions below.

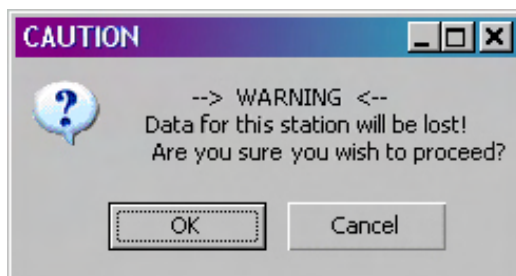
4.3 Downloading Profile Program to Station

Before deployment, the file you created from YSI Profile Wizard must be sent to the profiling system for proper system data collection to occur. Under the Program section you may see the default setting (-Unknown-) if no program exists in the data logger. Click the **Send** button.

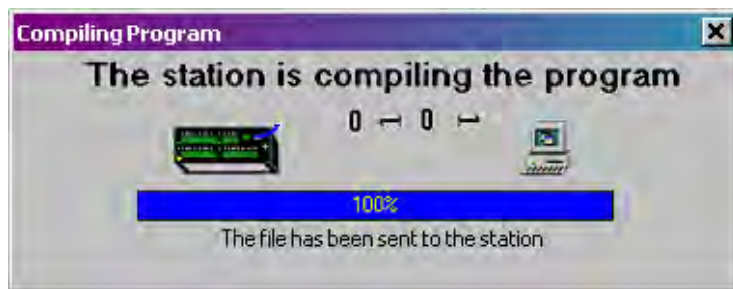
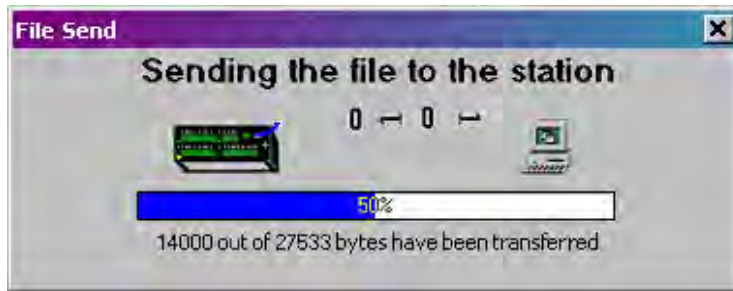
You should now see a browse window open that allows you to locate the *.dld file that you created in Profile Wizard. The file contains the information for the profiling routine, and must be downloaded to the CR10X.



In the browse window, locate the folder where you saved the .dld file during the Profile Wizard setup. The default directory is C:\Program Files\YSI\Profile Wizard\Shared. The .dld file will have the same name as the station location created initially with Profile Wizard. Highlight the file that will appear under Shared and click Open. The following warning should appear.

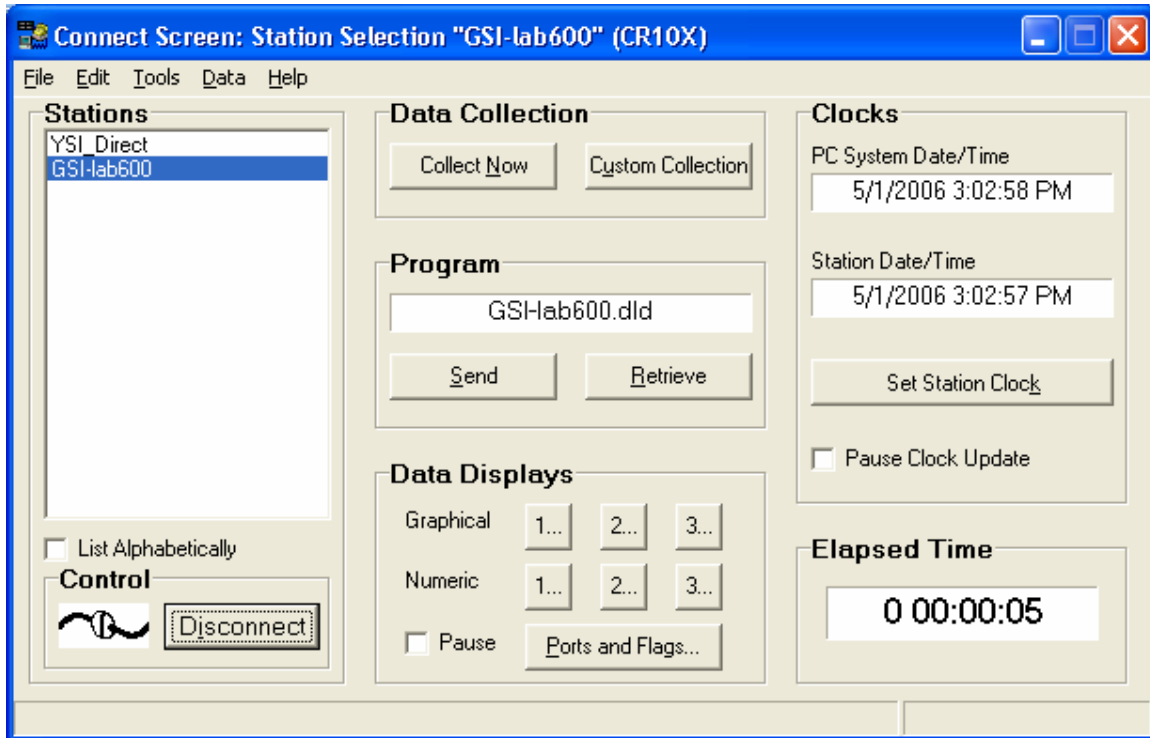


Click OK to initiate the transfer of the file to the CR10X. This may take a couple of minutes. A status screen appears showing you the status of the transfer and then the completion of compiling of the program. After this a screen appears confirming that the file has been 'downloaded to the station' (CR10X).



Click OK to continue.

The screen will now show the current Profiler setup filename under Program in the Connect Screen window. The filename used in this example was GSI-lab600.



You have now successfully established communication between the PC (LoggerNet) and the Station (CR10X data logger, residing within the Controller Assembly of the Profiler system).

In Section 5 you will perform pre-deployment tests that will test your system and prepare you for taking a fully operational system to the field site.

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Section 5

Pre-Deployment Testing

5.1 Setting Up LoggerNet™ for System Testing

In this section you will use LoggerNet™ control of the CR10X profiler program to test various components of the Profiler System prior to deployment activities. The following components will be tested, unless the component is optional and not present.

- Sonde response (RS-232 and SDI-12)

- Winch motor control

- Depth sounder or Fixed reference sonde

- Compass

- Meteorological sensors

- Communications

Before proceeding you should review operation of the Campbell Scientific CR10X Data Logger and LoggerNet™ application software. Review the LoggerNet™ Quick Start Guide, and if necessary, the LoggerNet™ user's manual.

The procedure in this section assumes that you have completed LoggerNet™ Station configuration and setup. If not, then refer to information in previous sections of this manual. In particular, verify that the YSI 6-series sonde is set up as specified in Section 3.2, Setting Sonde Parameters. Verify that the sonde is

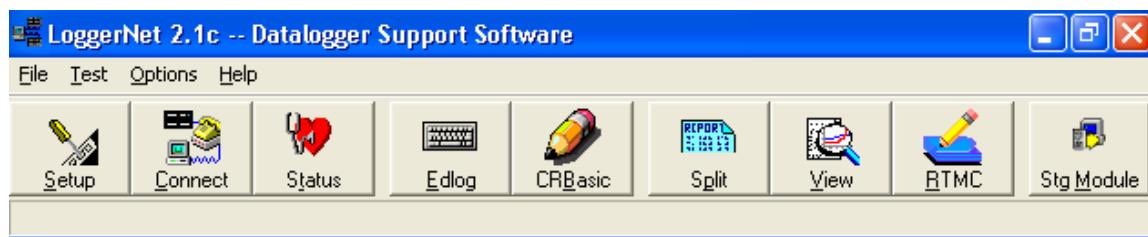
- Not set to log in Unattended Mode

- Not set to report date and time in Report setup

- Is set to SDI-12 address = 0

- Is set to report depth in meters

Refer to Section 3 of this manual if you need to verify any of the above sonde parameters.

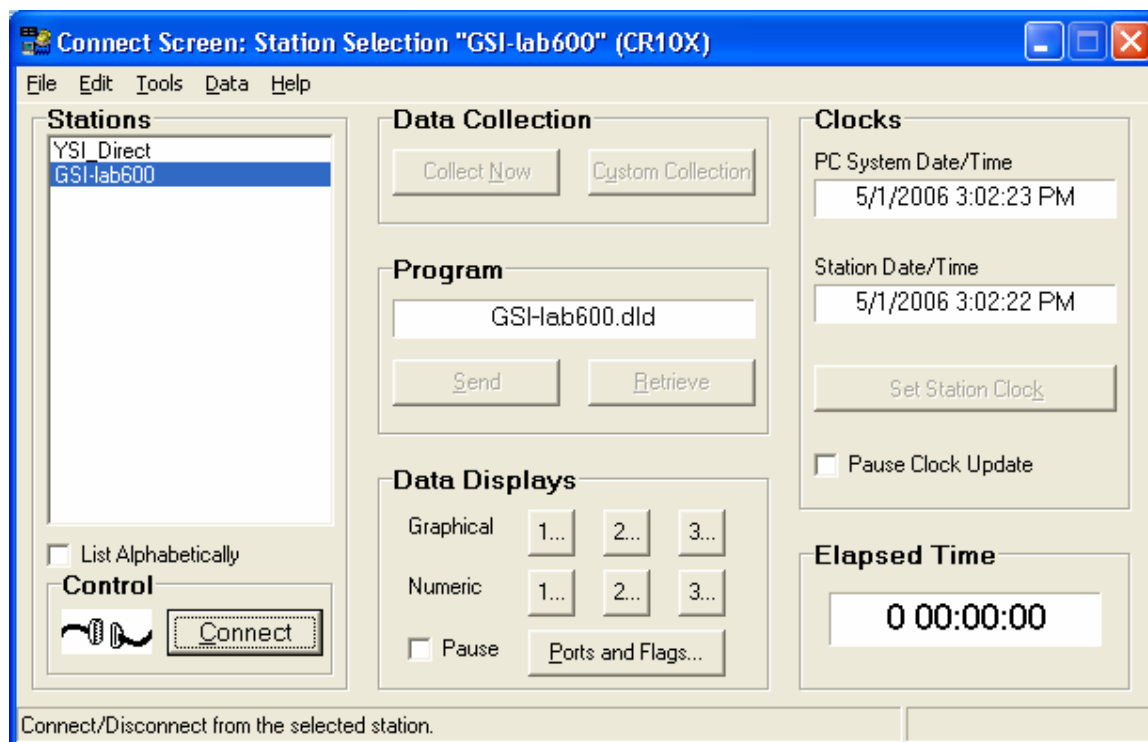


Start LoggerNet. With the LoggerNet Toolbar on the screen, click on **C**onnect to open the Connect Screen. From this screen click to highlight the Station (GSI-lab600)¹, and then click on the **C**onnect... button near the cable icons (bottom left).

Disconnect for now. Resume this operation in Section 5.2

NOTE:

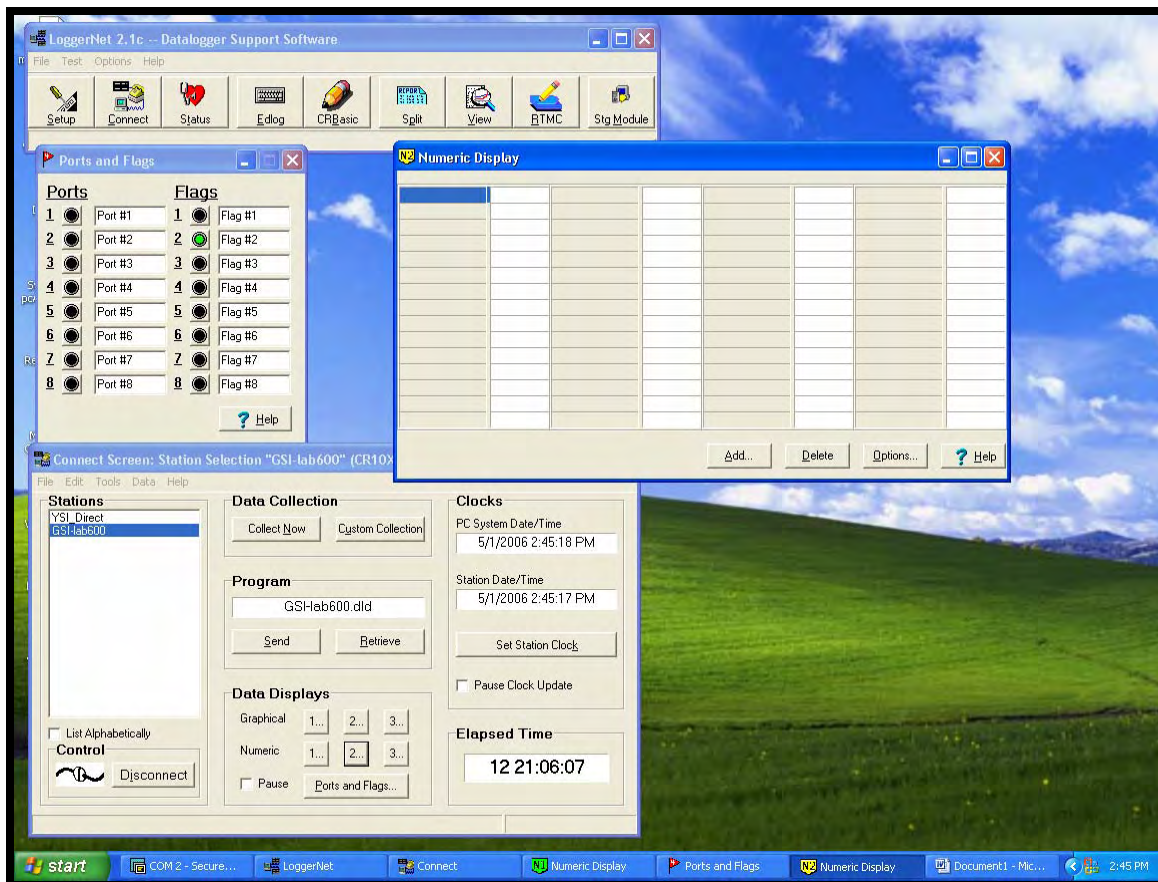
If a station is not set up, return to Section 4 of this manual and refer to the LoggerNet manual to set up a station.



¹ Note in this example, GSI-600lab has been previously downloaded as seen in the Program field.

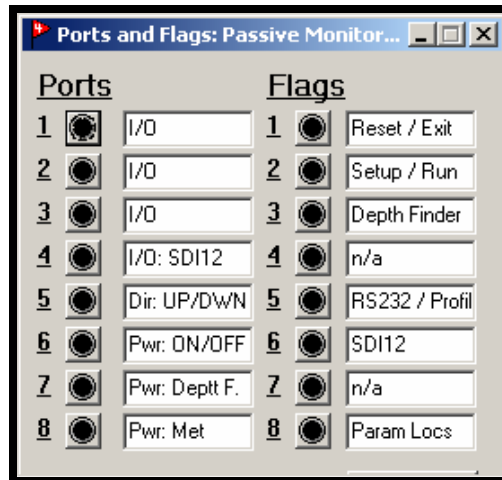
PORTS, FLAGS AND NUMERIC DISPLAYS

There are several windows in LoggerNet that you should now open. From the Connect Screen you can open the Ports and Flags window. The Ports and Flags window depicts the status of various functions and is interactive in that you can click on the circular icons to turn ON/OFF various functions. The Numeric Display windows provide a table of cells where information on the status of parameters, operations, memory locations and the like are displayed. All of these windows may be displayed together at one time on your Desktop.

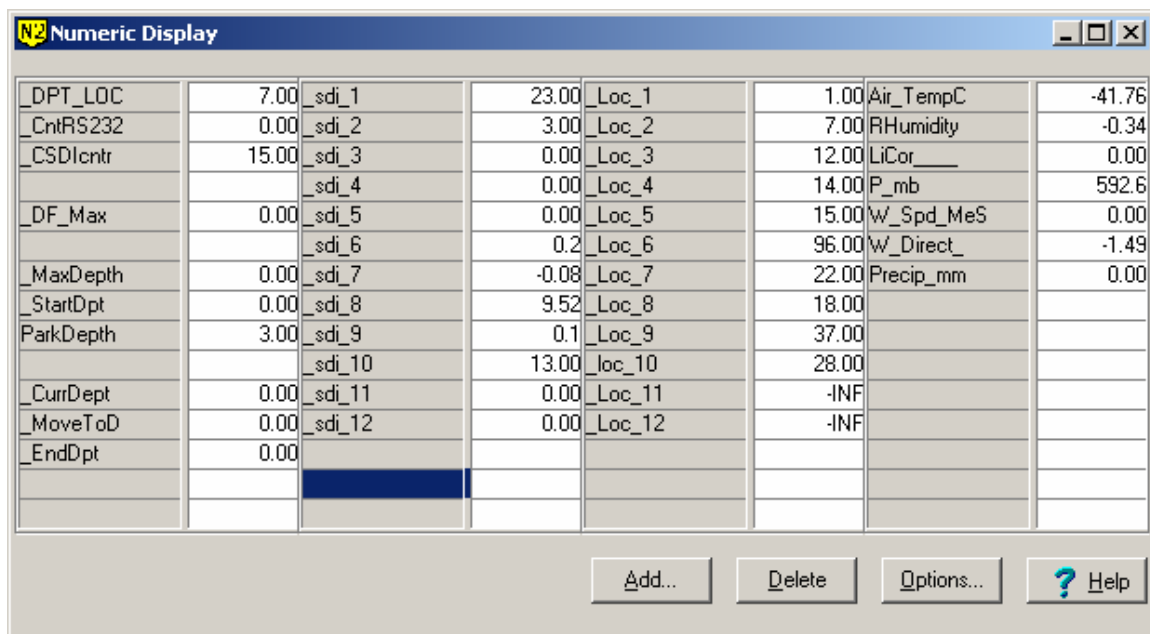


From the Connect Screen within Data Displays (bottom center) click on the Ports and Flags... button to open the Ports and Flags window (see screen below). You will use this window and your mouse to turn functions ON and OFF in many of the tests later performed in this section. The circular icons respond to mouse clicks. Green is ON (high) and blank is OFF (low). None of the 'switches' shown below are active in this image.

Try to become familiar with the descriptions below at each Port and Flag location. This will be helpful when you begin pre-deployment testing. YSI recommends entering these custom Port and Flag names to help clarify the purpose of each. Click on the Port/Flag name field and type in the custom names below. These will be retained the next time you open the Ports and Flags dialogue.



Within Data Displays, and just to the right of Numeric, click on the 1... button to open a blank Numeric Display window. This window has three pairs of columns where you choose from a pop-up list of memory locations that represent parameters or functions you would like to monitor. The gray cells hold abbreviated descriptions, while the white cells exhibit values. An example is shown below.



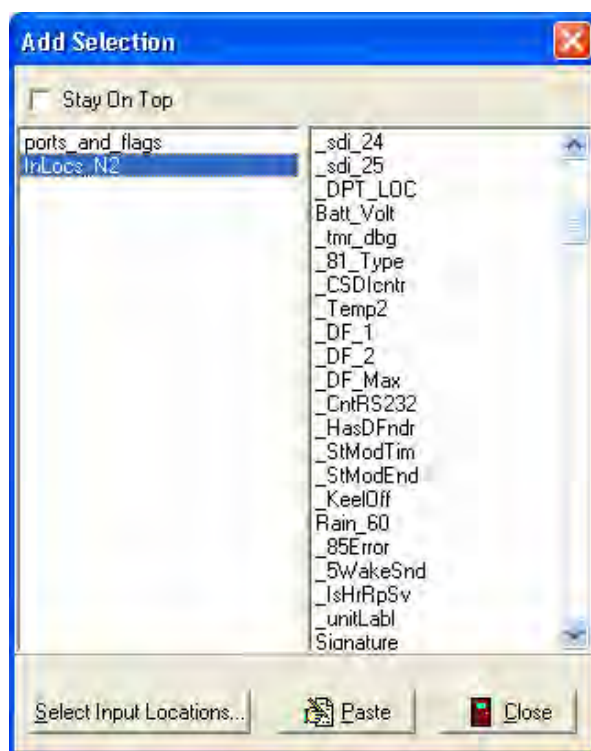
You will use the numeric display tables to assist in testing and/or troubleshooting the system. Once you prompt actions, you can quickly visualize the profiler operation from the values in the cells. When you first establish connection the values for each cell are typically blank, but fill in once program execution begins, either by program or by prompting actions.

You build a Numeric table by highlighting a gray cell. When you click on the **Add...** button a pop-up screen containing both Ports and Flags, and Memory locations will appear (see below). Choose one of the options. Scroll and tag the location you want then ‘paste’ it into the cell(s) by using the **Paste** button. You may tag several locations at once to paste them into a particular

column. It is customary to begin at the top left of the Display, but you have the option to choose any cell in any order. You will find that it takes some time to become familiar with the abbreviations, and the list of options is quite lengthy. The options chosen below will suit most of your needs for pre-deployment testing. Become familiar with those in the Numeric Display above for now and explore further parameters on the list as you have time.

See the Numeric Display table below. The pop-up list that offers a list of entries appears when you click and highlight a specific gray cell and then click on the Add... button.

You may open up to three numeric displays at the same time. In the example above all of the necessary information has been displayed on one numeric display (one window). Notice that values are shown in the white cells to the right of the parameter. The interpretation of some of these values will be used in the descriptions below.



Select only a few of the _SDI locations (_sdi_#), 12 locations maximum. If Meteorological sensors are an option, select these as well. However, **do not over-select** since the data logger may not be able to display all of the locations once the profile program starts. You may experience a loss of connection in this case. If you lose the connection, the program continues to execute, however, you will not see the updates.

Note that there are many parameters available to build the Numeric Displays. Of particular interest in depth profiling using a YSI sonde are the sonde parameter ID numbers².

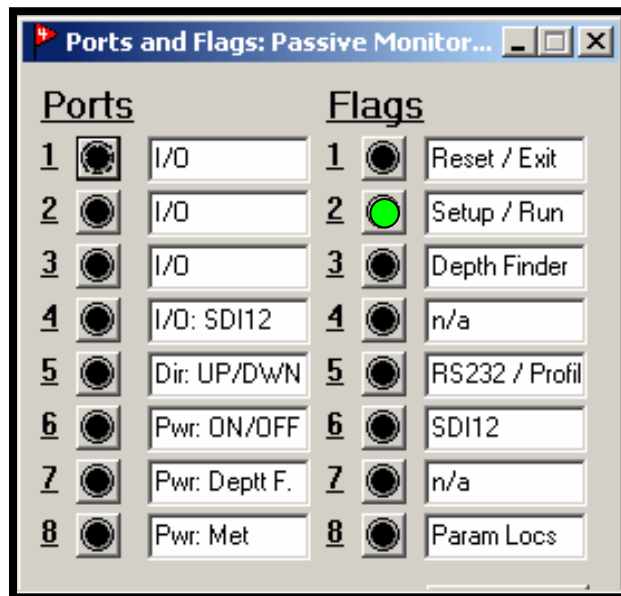
² See Appendix D in this manual for a complete list of these parameters.

5.2 Testing

You are now ready to reconnect the CR10X and begin testing components of the Profiler system. Do the following and verify that ports and flags behave as described below.

1. If necessary, power up the CR10X (Controller Assembly connector).
2. Wait about 10 seconds, and then press the **Connect** button.
3. If the CR10X was previously programmed, wait another 30 seconds for Flag 1 and Flag 2 to turn ON (green lights appear in icons).
4. Flag 1 will turn OFF after the CR10X initializes (a few seconds). At that moment you should hear a relay click ON/OFF from within the Controller housing.

The Ports and Flags display should now have Flag 2 illuminated green to indicate that it is set high or ON. This is Setup mode and the program remains idle until you prompt it.



NOTE:

If Flag 1 or Flag 2 does not turn ON, the program was not uploaded correctly.

NOTE:

If Flag 1 does not turn OFF after being on for a few seconds, the program was not uploaded correctly.

After Flag 1 turns OFF, remain connected to verify that the numeric display starts to update. Normally the updates occur every 10 to 20 seconds, starting approximately at the top of the minute. (Installed Meteorological sensors update every 60 seconds.).

NOTE:

When you select a Flag or a Port, it typically takes affect immediately. However, the response may not appear right away because of 'table repetition rates'.

At this point Flag 2 will stay on indefinitely. We recommend that all pre-deployment tests be performed before you start the profiler program. The procedure to start the profiler program will be described again below.

After pre-deployment testing you may start the profiler program by turning Flag 2 OFF and then turn Flag 5 ON. This will force a profile sequence within about 60 seconds (the repetition rate of the display).

Although the above Flag and Port names can be renamed to be more meaningful to you, we recommend that you learn the terminology at first before making these changes. See Appendix D for Sonde Parameter ID numbers, which may of particular interest in depth profiling applications.

RECOMMENDED PRE-DEPLOYMENT TESTS

NOTE:

Leave Flag 2 ON during all pre-deployment testing. This is setup mode. The system will not enter a programmed profiling routine until you invoke the command 3.

Use the parameters and values below in the Numeric Display along with explanations of each pre-deployment test.

Numeric Display							
_DPT_LOC	7.00	sdi_1	23.00	_Loc_1	1.00	Air_TempC	-41.78
_CntRS232	0.00	sdi_2	3.00	_Loc_2	7.00	RHumidity	-0.34
_CSDIcntr	15.00	sdi_3	0.00	_Loc_3	12.00	LiCor_	0.00
		sdi_4	0.00	_Loc_4	14.00	P_mb	592.8
_DF_Max	0.00	sdi_5	0.00	_Loc_5	15.00	W_Spd_MeS	0.00
		sdi_6	0.2	_Loc_6	96.00	W_Direct_	-1.43
_MaxDepth	0.00	sdi_7	-0.08	_Loc_7	22.00	Precip_mm	0.00
_StartDpt	0.00	sdi_8	9.52	_Loc_8	18.00		
_ParkDepth	3.00	sdi_9	0.1	_Loc_9	37.00		
		sdi_10	13.00	_Loc_10	28.00		
_CurrDept	0.00	sdi_11	0.00	_Loc_11	-INF		
_MoveToD	0.00	sdi_12	0.00	_Loc_12	-INF		
_EndDpt	0.00						

Add...
Delete
Options...
? Help

³ If you are confident that all is working, you may start the profiler. To do this turn Flag 2 OFF and then turn Flag 5 ON.

Test 1: Sonde Parameter ID Numbers

Select Flag 8 to view the sonde parameter locations. The list of `_Loc_1` through `_Loc_12` (shown above) will exhibit values relevant to sensor identification. When you click on Flag 8 for the first time, all of the ‘`_Loc_x`’ display `-INF`. You will need to wait about 60 seconds to see the actual values.

The string above (1, 7, 12, 14, 15, 96, 22, 18, 37, and 28) represents the sensor ID's. These values provide the necessary information to the program so that each sonde parameter is known. For example, the Sonde Depth in meters PARA (parameter) at location 7 is sensor ID 22. In other words, Depth in meters is ID #22 and resides in memory location 7. See Appendix D for a complete list of sonde parameter ID numbers. This test has limited value, but can be useful in troubleshooting problems.

NOTE:

When you select a Flag the parameter value will not appear until the data logger clock moves past the '00 second' mark.

Test 2: Sonde RS-232 and SDI-12 Responses

This test should be executed to verify that communications from sonde to controller are fully functional. Refer to the Numeric Display below during this explanation.

N2 Numeric Display							
_DPT_LOC	7.00	_sdi_1	23.00	_Loc_1	1.00	Air_TempC	-41.76
_CntRS232	0.00	_sdi_2	3.00	_Loc_2	7.00	RHumidity	-0.34
_CSDIcntr	15.00	_sdi_3	0.00	_Loc_3	12.00	LiCor____	0.00
		_sdi_4	0.00	_Loc_4	14.00	P_mb	592.6
_DF_Max	0.00	_sdi_5	0.00	_Loc_5	15.00	W_Spd_MeS	0.00
		_sdi_6	0.2	_Loc_6	96.00	W_Direct_	-1.49
_MaxDepth	0.00	_sdi_7	-0.08	_Loc_7	22.00	Precip_mm	0.00
_StartDpt	0.00	_sdi_8	9.52	_Loc_8	18.00		
_ParkDepth	3.00	_sdi_9	0.1	_Loc_9	37.00		
		_sdi_10	13.00	_Loc_10	28.00		
_CurrDept	0.00	_sdi_11	0.00	_Loc_11	-INF		
_MoveToD	0.00	_sdi_12	0.00	_Loc_12	-INF		
_EndDpt	0.00						

Add...
Delete
Options...
? Help

Set Flag 5 to read the sonde via the RS-232 communications port. The results to interpret appear in the far left two columns above. The _CntRS232 refers to the counter for RS-232 readings. The counter increments about one time every second for 4 to 5 seconds. If the counter exceeds 5, then the sonde is not responding. The reading in the Display does not exceed the maximum of 6 counts.

Set Flag 6 to read the sonde via the SDI-12 communication port. The results to interpret appear in the left two columns as in the previous test. The `_CSDIcntr` refers to the counter for SDI-12 readings. Approximately every 2.5 seconds the counter increments. The readings may vary based on the DO warm up setting, but a typical count would be 17 to 18. The reading above is 15.00, and is considered acceptable. In some applications where two wiping cycles are required for optical probes, counts may exceed 18. Each wiper takes about 38 seconds, therefore 76 seconds for two optical wipes. This would result in a count that would exceed 30 even though DO warm up remained 60 seconds. The maximum number allowable for this counter is 35.

Test 3: Depth Finder Reading Response

NOTE:

Perform this test only if your system has a Depth Finder or Fixed Reference sonde. If you employ User Defined Depth, neither Flag 3 nor Port 7 will show a response.

This test should be executed to verify that the Depth Finder (depth sounder) sensor is working. In order to observe any reasonable reading the depth finder must be in water. You can simulate this inside with a bucket or barrel of water. The movement from water to air or vice versa can reveal qualitatively if the depth finder is working.

Set Flag 3 to read the Depth Finder result. The results to interpret appear in the left columns of the Display as in previous tests. The `_DF_Max` term designates the cell to look for results. The result in this example is 0.00, indicating an operational depth finder. A faulty sensor or a sensor in air only will likely read -INF.

If your system is configured with a Fixed Reference Sonde rather than a Depth Finder, then add Location `_92 RefTmp` and `_92RefDpt` to the Numeric Screen. The information you need will be displayed in these locations and in the `__sdi_#` column.

IMPORTANT:

The Fixed Reference Sonde must be set to have only two Report parameters enabled: **Temp in C, and Depth in Meters**. They must appear in the order shown and in the units of measurement shown.

Test 4: Winch Motor Responses

You should perform this test to verify that the winch motor is operating, and works in two directions (pays out; reels in). First note that this is a Port set, not a Flag set as in the previous tests.

CAUTION:

Port 5 should be set OFF to perform this test for the first time. This will result in cable paying out, not reeling in, which could cause problems if the sonde is not connected.

Set Port 6 ON to turn on the Winch motor. The motor should turn on and pay out cable. The sonde does not need to be connected to perform this test. Help guide the cable with some hand

tension on the cable if you perform this test without actually submersing the sonde. To turn the motor off, click on Port 6 again to turn it OFF (no green light).

Set Port 5 ON to reverse the direction of the Winch motor. You should turn Port 6 OFF (stop motor) then set Port 5 ON. Turn Port 6 ON again. You should observe the Winch reel in cable. Again help put some tension on the cable with your hands if you perform this test without actually submersing a sonde in water. Click Port 6 again to turn the motor OFF. The green light should not be visible at Port 6 at this time.

Quick Guide to Sonde Movements

To move sonde down:

Verify that Port 5 is OFF
Turn Port 6 ON

To stop sonde motion (up or down):

Turn Port 6 OFF

To move sonde up:

Turn Port 5 ON

Turn Port 6 ON

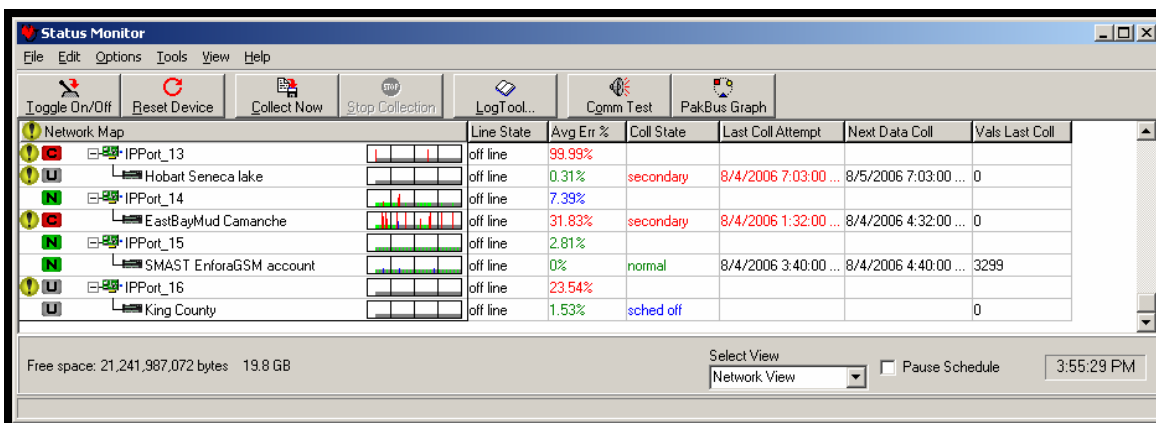
In summary, all of the tests above must produce data and/or motor movements. Verify that the data is reasonable as explained in each section. Verify that each command results in a certain number of attempts before it 'gives up'. For example if you see the SDI-12 counter exceed 18 this could mean that the DO warm-up time is set extremely long, or it could mean the sonde is not responding to an SDI-12 command. A 60 second DO warm up time typically produces a count of 18 or so, but may read higher if optical probe wipers are set to wipe each interval. A second example, the Depth Finder obviously will vary with depth. Shallow water may result in 2 to 3 attempts, while deeper waters could mean 10 to 15 attempts. When you interpret counter readings, consider your test conditions.

OTHER PRE-DEPLOYMENT TESTS

The tests you performed above provide valuable information related to functionality of your system components and communication between these components. You may perform additional tests that may be valuable. Some of these are for subsystems that are optional on your YSI Profiler. For example, you may have meteorological sensors that you would like to confirm working.

Refer to the tables below to understand what the Ports and Flags control. The tables differ slightly depending on whether you are working in Setup Mode (Flag 2 ON) or Profiling (Operational) Mode (Flag 2 OFF).

Many of the tests described above have explained the function of these ports and flags. The tables below should help you further explore testing of interest. In addition use the Status Monitor (shown below) to monitor system operation. Keep in mind that when the collection schedule is enabled it has precedence over the Connect Screen.



Refer also to the LoggerNet user's manual for additional information. Many tests may be more useful if something does not work as expected. Using port tests and flag tests are of particular usefulness in troubleshooting problems.

SETUP MODE (Ports and Flags)	
Ports	Action and/or Response
C1	I/O module
C2	I/O module
C3	I/O module
C4	SDI-12 data line for sonde
C5	DPDT direction relay control for winch motor: Up (ON); Down (OFF)
C6	Powers winch motor: motor runs (ON)
C7	Powers depth finder: (ON)
C8	Powers MET sensors and compass; (ON)
Flags	
F1	Reset – Initializes system variables: (ON); turns OFF automatically
F2	Setup Mode (ON); Profile/Run Mode (OFF)
F3	Depth Finder Reading/Fixed Ref Sonde: (ON) DO NOT TURN ON during profile sequence.*
F4	Compass Output: (ON) DO NOT TURN ON during profile sequence.*
F5	RS-232 Reading of Sonde: (ON) DO NOT TURN ON during profile sequence.*
F6	SDI-12 Reading of Sonde: (ON). DO NOT TURN ON during profile sequence.*
F7	n/a
F8	Initializes C7 to OFF. DO NOT TURN ON during profile sequence.*

*If Ports are flickering ON and OFF, then system is probably in the middle of a profile sequence.

5.3 Start a Profiling Sequence

Once you are satisfied with the results of your pre-deployment tests in Setup Mode, you are ready to start a profiling sequence. Presumably your sonde is in a simulated depth profiling environment, whether it outside in the water or on a test setup inside.

To begin set **Flag 2 OFF** and set **Flag 5 ON**. You may leave the Ports and Flags screen up to monitor activity. When communication takes place, these screens will provide updates. Remember that actual events and the communication of these events may not be at the same

time. You will not necessarily be watching real time updates since repetition rates of the numeric displays delays results.

WHAT SHOULD YOU SEE?

Ports C1, C2, and C3 occasionally flicker on and off. This indicates active communication between the CR10X and the SDM04 I/O module.

Port C4 should never come on. It is an I/O port dedicated for SDI-12 communication to and from the sonde.

Port C5 and Port C6 are the motor control ports that indicate when motor is moving and what direction it is moving.

Port C7 is the Depth Sounder power strobe line. The outputs are indicated at locations `_DF_1`, `_DF_2`, `_DF_Max`, and `_DF_Depth`.

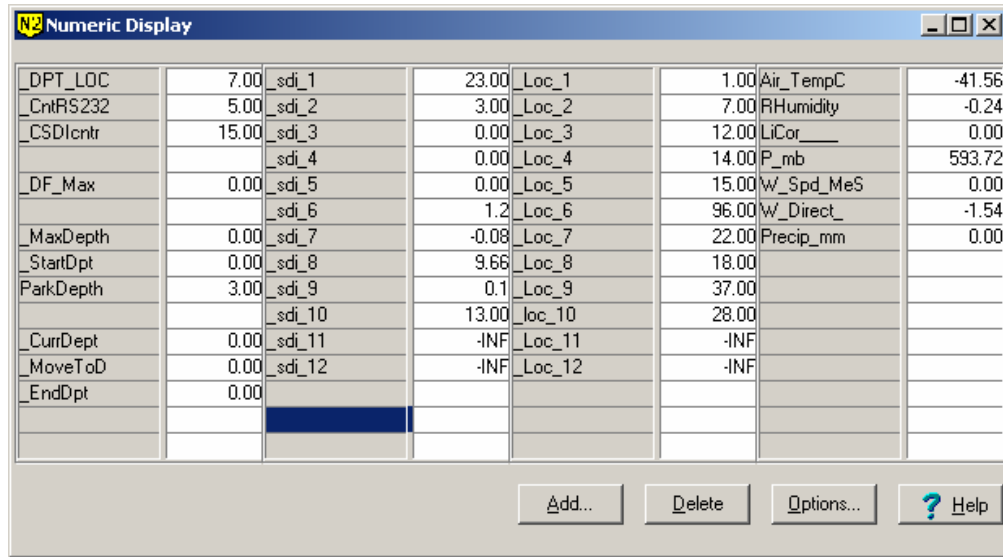
The Depth sounder collects two samples. Parameter `_DF_1` is the first sample, and `_DF_2` is the second sample. The `_DF_MAX` is the greater of the two readings that then becomes `__DF_Depth +0.4`.

Port C8 is reserved for MET sensors.

YSI Environmental maintains a parameter identification list for its internal use. When a YSI device outputs a string of data, it usually does not have an identifier associated with it. However, a command can be sent to a sonde to confirm the location.

Sonde PARA (parameter) identifiers were discussed above. A complete list of identifier number can be found in Appendix D. In the Numeric Table two examples may be pointed out. First, you will find in Appendix D that ID #1 is Temperature in Celsius. Second, you will find ID #22 is Depth in Meters. These Identifiers are “set in stone”; they do not change.

So, if we look at the `_loc _#` in the screen below we can tell that Temp is the first parameter in the string of data, and the `_sdi_1` reading is 23 (23 C). We can also tell that Depth in meters is in the 7th location, and the `_sdi_7` is displaying -0.08 meters. The PARA identifiers can vary from sonde to sonde depending on the user application so the program uses the PARA command repeatedly to ascertain the depth location in the sonde output data string. This is the only way the program knows for certain which parameter is Depth in meters. If the sonde Depth is set to Feet, the PARA command will not return a identifier of 22 and the program is forced to abort into setup mode. Hence, this is the importance of verifying sonde parameters prior to creating a profiling routine.



The screenshot shows a window titled "N2 Numeric Display" with a table of sonde parameters. The table has 8 columns and 15 rows. The parameters are listed in the first column, and their corresponding values are in the subsequent columns. The values are displayed in a grid format with alternating light and dark gray rows.

Parameter	Value	Parameter	Value	Parameter	Value	Parameter	Value
DPT_LOC	7.00	_sdi_1	23.00	_Loc_1	1.00	Air_TempC	-41.56
_CntRS232	5.00	_sdi_2	3.00	_Loc_2	7.00	RHumidity	-0.24
_CSDIcntr	15.00	_sdi_3	0.00	_Loc_3	12.00	LiCor_	0.00
		_sdi_4	0.00	_Loc_4	14.00	P_mb	593.72
_DF_Max	0.00	_sdi_5	0.00	_Loc_5	15.00	W_Spd_MeS	0.00
		_sdi_6	1.2	_Loc_6	96.00	W_Direct_	-1.54
_MaxDepth	0.00	_sdi_7	-0.08	_Loc_7	22.00	Precip_mm	0.00
_StartDpt	0.00	_sdi_8	9.66	_Loc_8	18.00		
ParkDepth	3.00	_sdi_9	0.1	_Loc_9	37.00		
		_sdi_10	13.00	_Loc_10	28.00		
_CurrDpt	0.00	_sdi_11	-INF	_Loc_11	-INF		
_MoveToD	0.00	_sdi_12	-INF	_Loc_12	-INF		
_EndDpt	0.00						

At the bottom of the window, there are four buttons: "Add...", "Delete", "Options...", and "? Help".

Definitions for some Parameters chosen for the Numeric Table above.

_Loc_1,2,3,.... Indicates PARA identifiers (See Appendix D for a list of all sonde parameters)

_DPT_LOC Indicates the YSI sonde depth location

_CntRS232 Indicates number of attempts to get data from the sonde via the RS232 port.

_CSDIcntr Indicates number of attempts to get data from the sonde via the SDI-12 port.

_DF_Max Max water depth for a profile

_MaxDpt Max water depth from the Profile Wizard configuration

_StarDpt Start water depth from the Profile Wizard configuration

ParkDpt Sonde Park depth from the Profile Wizard configuration

_CurrDpt Current water depth of the sonde in a profile

_MoveToD Water depth sonde will try to move to.

_EndDpt End depth of water the sonde can travel from the Profile Wizard configuration

_92Temp Fixed Reference Sonde first parameter (water temperature)

_92Depth Fixed Reference Sonde second and last parameter

SERVICING THE SONDE

As previously mentioned when the time comes to disconnect the sonde from the winch for calibration or service you must wait for the profile to end. If that's not possible, then you must turn power off to the winch.

Ideally sonde servicing should take place by rotating a spare sonde into service while the system is in between profiles (idle at Park). When this is not possible and the sonde must be removed for on-site calibration, then the system needs to be stopped temporarily.

Connect a lap top to the Controller Assembly using the Diagnostic Cable. Start LoggerNet™ and connect to the station. At this point Flag 2 should be OFF (low). No other flags or ports should come ON except for Port 8 which will turn ON briefly every 60 seconds. If the Ports are flickering ON and OFF, then the system is probably in the middle of a profile sequence.

Turn Flag 2 ON (high). This puts the Profiler system into Setup Mode keeping it in idle mode for the duration of the service procedure.

Once sonde servicing is complete, connect the sonde to the winch cable and verify proper sonde operation using the LoggerNet™ flags.

If you are satisfied with the tests, you can exit Setup mode by setting Flag 2 OFF (low). If you want to start a profile immediately, then set Flag 5 ON (high). Otherwise the profiling routine will be determined by the clock and you may be required to wait for some time.

IMPORTANT:

YSI recommends that after you service a sonde you should start a profile and verify sequence operation before departing the remote site.

TESTING COMMUNICATIONS

YSI Profiler platforms may use a variety of wireless communications options. Each has its own distinctive set of problems. In this section you learned to setup modem communications and we touched on using a similar method with IP addresses. If you have a laptop computer, the system can be tested prior to moving to the remote site. This test is worth the time, but is no substitute for testing on site. With a cellular modem in the system and a cell phone, you could collaborate with a colleague to check communications between remote and base sites. The methods for testing are fairly standard and each user typically has their preferences.

If you have any problems with communications do not hesitate to call Endeco/YSI. The contact information can be found in Appendix A.

In the following section of this manual a very general discussion for transporting and securing a YSI Profiler to a remote site will be discussed.

Deployment & Maintenance

6.1 Transporting Platform and Deployment Examples

After all pre-deployment testing is completed, you will now need a plan to transport your Floating Platform system to its remote site. The pontoon version can normally be taken by trailer to the water where final checkout of the system is recommended. The buoy version may require a hoist or some other means to transfer it to the water. There are many ways to handle this.

Below are a few photographs of deployment procedures to give you some ideas. Do not hesitate to contact Endeco/YSI if you need help. Contact information is in Appendix A of this manual.

Pontoon Platform on Inland Reservoir



Figure 6-1 Final checkout using Diagnostic Cable and laptop PC to test system just prior to launch onto an inland reservoir.



Figure 6-2 Panels in place, Profiler secured to side of motor boat for transport to remote site on reservoir.

The deployment shown above is seasonal. In late fall the platform is removed for cleaning and maintenance. Routine maintenance is described below in this section.

Pontoon Platform in Bay – Coastal waters with tide; Depth Sounder employed.



Figure 6-3 Profiler anchored (single point) in coastal waters. In addition to depth profiler, equipped with meteorological suite for monitoring surface conditions. Counter-weights employed for stability. Compass installed to correct for wind direction as pontoon rotates with wave action. Depth finder mounted from support attached to deck to compensate for tidal changes in depth.

Buoy Platform in Bay: Hoist required for Deployment



Figure 6-4 Buoy platform version near dock. Hoist required for setting in and taking out of water.

Fixed Mount Depth Profiler – Not a Floating Platform



Figure 6-5 Dock-mount Profiler (fixed mount version)

The YSI Profiler is occasionally used in a fixed mount configuration. The Winch Assembly is separately attached. The Controller Assembly involves the same electronics, but packaged in a standard NEMA enclosure. Solar panels may be replaced by regulator that is AC powered. PVC pipe helps guide the sonde from the surface to the winch drum. Antenna (not visible) for RF or cellular modem attached to pole.

Each deployment is slightly different. If you are unfamiliar with these types of deployments, write down your requirements, environmental conditions during the season, concerns you may have about stability, security and any other issues. Endeco/YSI should be able to help you with your application and deployment. Call or write. Contact information is in Appendix A.

6.2 Testing Communications

YSI Floating Profiler platforms may use a variety of wireless communications options. Each has its own distinctive set of issues.

In Section 5 you learned to set up modem communications and you learned some about using a similar approach to set up communication through an IP address for Web access. If you have a laptop computer, the system can be tested prior to moving to the remote site. This test is worth the time, but is no substitute for testing on site. If possible, verify that your communications equipment will work on site prior to pre-deployment checkout. Contact your cellular carrier or RF radio manufacturer to inquire about reception at the remote site you intend to use.

We recommend that you arrange some way to verify a working communications system on site. With a cellular modem or any wireless setup in the Profiler system and a cell phone, you could collaborate with a colleague to check communications between remote and base sites. The base user can use LoggerNet to initiate actions that are prearranged. If there are problems, some troubleshooting can be done on site by using cell phone vocal communication in combination.

If you have problems and they are not obvious, consult your communications manual and double check setup configuration during configuration of your Profiler system.

6.3 Maintenance – Servicing the Sonde

Refer to your sonde manual for specific care and maintenance procedures. Care and maintenance depend on both the sonde model and the sensors you have installed. Other than the obvious visual inspections and cleaning, calibration frequency varies from sensor to sensor. There are some specific concerns when servicing a sonde used in the YSI Profiler. These points are made below.

As previously mentioned when the time comes to disconnect the sonde from the winch for calibration or service you must wait for the profile to end. If that is not possible, then you must turn power off to the winch motor.

Ideally sonde servicing should take place by rotating a spare sonde into service while the system is in between profiles (idle at Park). When this is not possible and the sonde must be removed for on-site calibration, then the system needs to be stopped temporarily.

Connect a lap top to the Controller Assembly using the Diagnostic Cable. Start LoggerNet™ and connect to the station. Use the Ports and Flags function to track activity. At this point Flag 2 should be OFF (low). No other flags or ports should come ON except for Port 8 which will turn ON briefly every 20 seconds. If the Ports are flickering ON and OFF, then the system is probably in the middle of a profile sequence. Do not disconnect the sonde if this is the case.

Turn Flag 2 ON (high). This puts the Profiler system into Setup Mode keeping it in idle mode for the duration of the service procedure.

Once sonde servicing is complete, connect the sonde to the winch cable and verify proper sonde operation using the LoggerNet™ flags

If you are satisfied with the tests, you can exit Setup mode by setting Flag 2 OFF (low). If you want to start a profile immediately, then set Flag 5 ON (high). Otherwise the profiling routine will be determined by the clock and you may be required to wait for some time.

IMPORTANT:

YSI recommends that after you service a sonde you should start a profile and verify sequence operation before departing the remote site.

6.4 Maintenance – Servicing Other System Components

BASIC INSPECTION & PROCEDURES

Use the following descriptions to check your system and then refer to the maintenance schedule that follows. Use the manuals that accompany most components of the YSI Profiler System to help guide you through care and maintenance. When in doubt about an issue contact Endeco/YSI.

Winch Assembly:

Motor and motor gear:

1. No direct maintenance required.
2. Ensure motor mounts remain tight
3. Inspect housing/hardware for damage or corrosion

Axle

1. Check axle for excessive wear on the pillar blocks.

Drum:

1. Check drum flanges for damage and excessive wear.

Slip ring cover

1. Check tolerance fit.
2. Inspect O-ring and slip ring.

Other Components:

Desiccant Cartridge

1. Check for color changes.

Battery

1. Insure posts are corrosion-free
2. Check battery for secure connections
3. Check battery voltage capacity

Electronics Controller

1. Check all connectors and cables for proper fit.
2. Check seals

Antenna

1. Check cable and cable connectors for secure fit.
2. Check cables for damage
3. Check antenna rubber boots for damage

Solar Panel

1. Maintain panels free of dirt and debris.
2. Check output voltage.

Depth Finder

1. Check cable and depth sounder assembly for damage and wear.

Fixed Reference Sonde

1. Check cable, sonde, and sonde attachment for damage and wear.
2. Inspect sonde reference point periodically for proper distance from bottom.

Float and/or Mooring

1. Check cable and depth sounder assembly for damage and wear.
2. Check mooring lines and buoys

6.5 Maintenance Schedule

The table below shows times for periodic maintenance and/or inspection.

Component	Part	New Installation	Inspection Period (months)		
			3	6	12
Winch Motor	Brushes	√	√		
	Gear	√	√		
Couplings	Set screws	√		√	
	Spider	√		√	
Winch Drum	Flange screws	√			√
Slip Ring Cover & o-ring		√		√	
Desiccant		√	√		
Sonde cable		√		√	
YSI sonde		√		√	
Battery		√		√	
Controller Assy		√		√	
Antenna		√	√		
Solar Panel(s)		√	√		
Depth Finder		√			
Fixed Reference Sonde		√	√		
Float		√		√	
Mooring		√		√	

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Section 7

Data Collection & Analysis

7.1 Data Collection

Refer to the Campbell Scientific, Inc. LoggerNet™ user's manual for detailed information on the collection and analysis of data. If data files are available, you may want to try the YSI Profile Data Manager. See instructions on using this program in Section 7.2 of this manual.

7.2 YSI Profile Data Manager

Profile Data Manager™ is a data manager program intended for use with the YSI Profiler System. It is used to analyze depth profile data, automate graphic creation, and set up graphic transmission via FTP to a specified server or local drive. Note that in the main screen of Profile Data Manager there are three distinct fields or panels. The first (labeled 1 in Figure 7-1) is related to data analysis; 2 is related to set up automation for the profile parameters used in displaying graphs and tables; and 3 is used to set up and test FTP settings related to the automation stations.

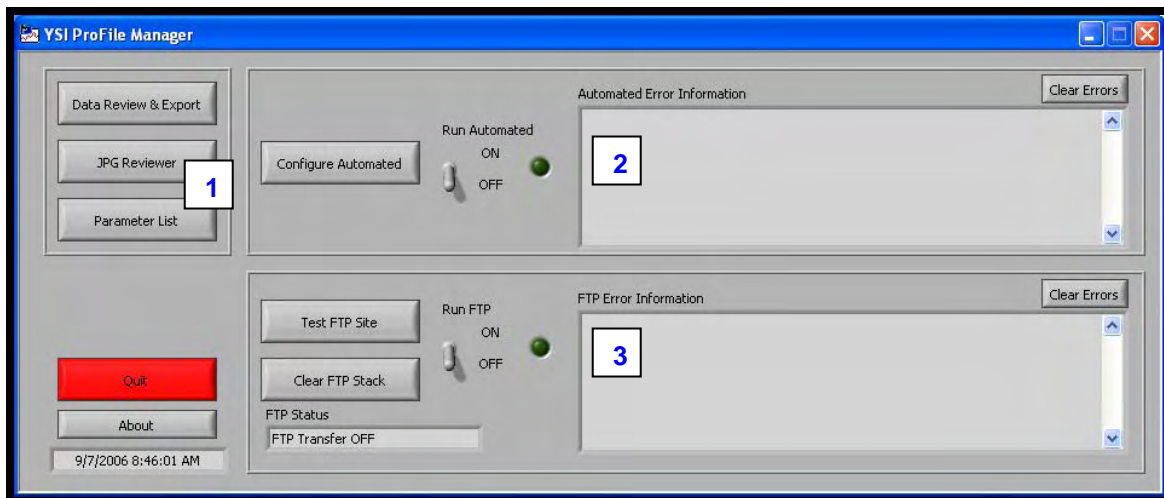


Figure 7-1 Main Screen of YSI Profile Data Manager

Data Analysis

In this section you can review the profile data in a graphical or table format. You can also review any graphics created and rename the parameter labels that appear in the graphics. See Section 7.3 Data Analysis for detailed instructions and examples.

Automation Setup

In this section you can select profile parameters to graph and assign the number of profiles to include in the graphs. You can also set up FTP settings or select a local drive for graphics delivery. See Section 7.4 Automation Setup for detailed instructions and examples.

FTP Test

In the FTP Site Test section you can test your FTP settings for each of the Automated Stations without going into the Automation section. See Section 7.5 FTP Settings for detailed instructions.

7.3 Data Analysis

Double click the Profile Data Manager icon on Windows Desktop to begin data analysis. Alternatively, click on Start and locate Profile Data Manager under Start | Programs | YSI Profile Manager. The screen shown in Figure 7-1 appears.

Click the Data Review & Export button in the upper left corner of the Main Screen. The Review and Export window will appear as shown in Figure 7-2.

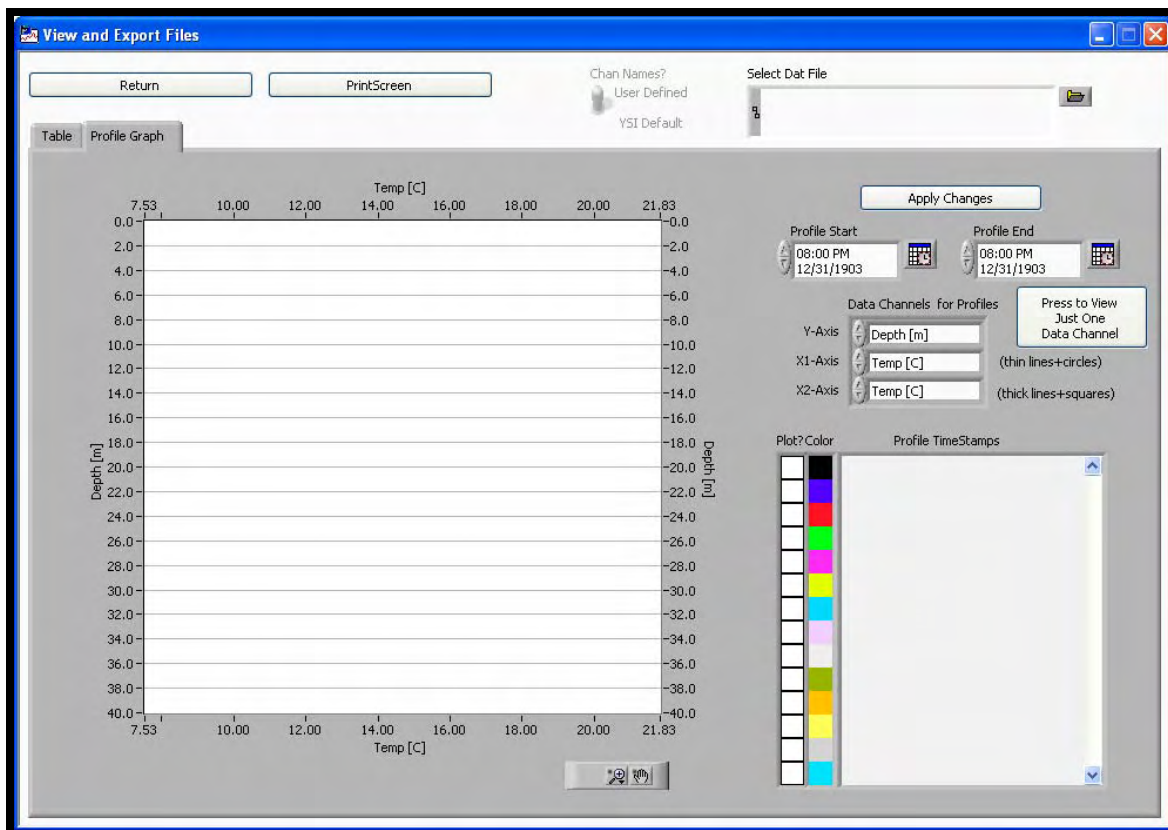



Figure 7-2 Data Review and Export Files Screen

At any time while in the Data Review & Export window, you may use either of two buttons in the upper left corner of the screen. They are both active when this window is open. Click **Return** to go back to the Profile Data Manager Main screen; click **PrintScreen** to send a screen image to the default printer.

At the top right corner of the screen is a 'folder' icon.  Use this button to browse for files that are stored in the Profile Wizard Shared directory. Any .DAT file may be opened from this screen. When opened, the filename you choose appears in the File Name field.

A blue status bar may briefly appear, and then you see a screen that has a 'plot' field on the left side. Refer to these screens below and try to plot data from any .DAT file in the Shared directory.

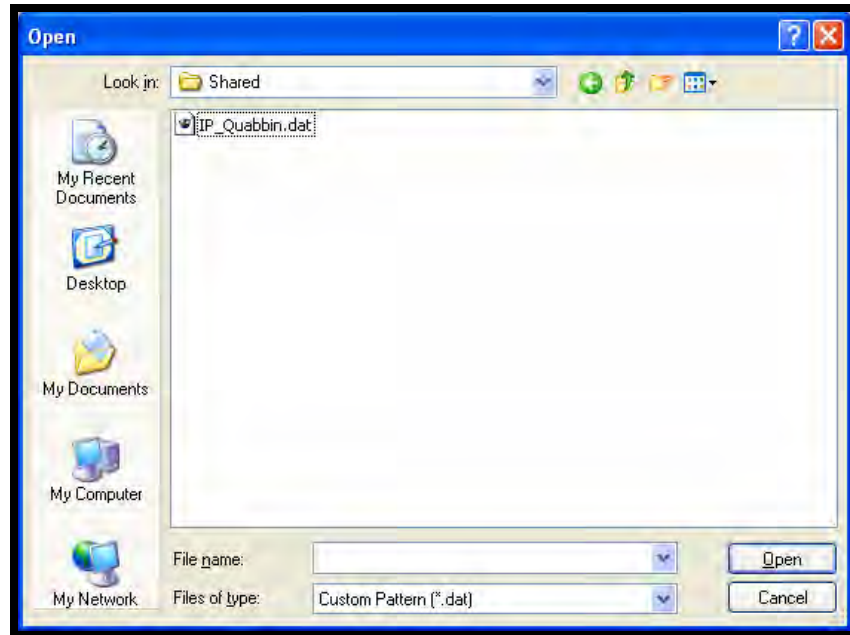


Figure 7-3 Window showing Shared Directory *.dat files

Profile Data Manager opens the Shared folder under the YSI Profile Wizard as a default. If the data file you collected is in a different directory path, use the pull down field at the top of the window to locate the data file (see Figure 7-3). Click on the file of your choice to highlight it, and then click the Open button.

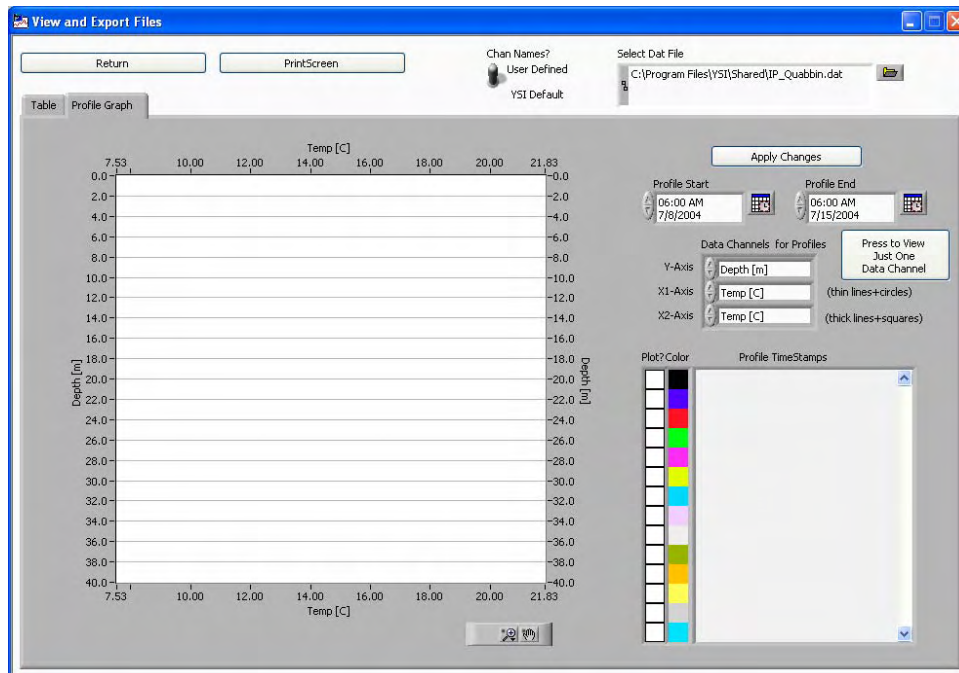



Figure 7-4 Data file IP_Quabbin selected for analysis (top right)

The file name and location now appear in the Select Dat File field at the top right corner. See Figure 7-4. The Profile Start and Profile End fields can be modified by clicking the up and down arrows to the left of each field, or by clicking the calendar icon  and selecting the time, month, date and year. Under Data Channels for Profiles, select the desired parameters to graph. As a default, depth is graphed along the y-axis. Choose Temp C and DO% as x-axis parameters. Click Apply Changes. Dates and times of profiling data now appear in the Profile TimeStamps box (lower left field in Figure 7-5).

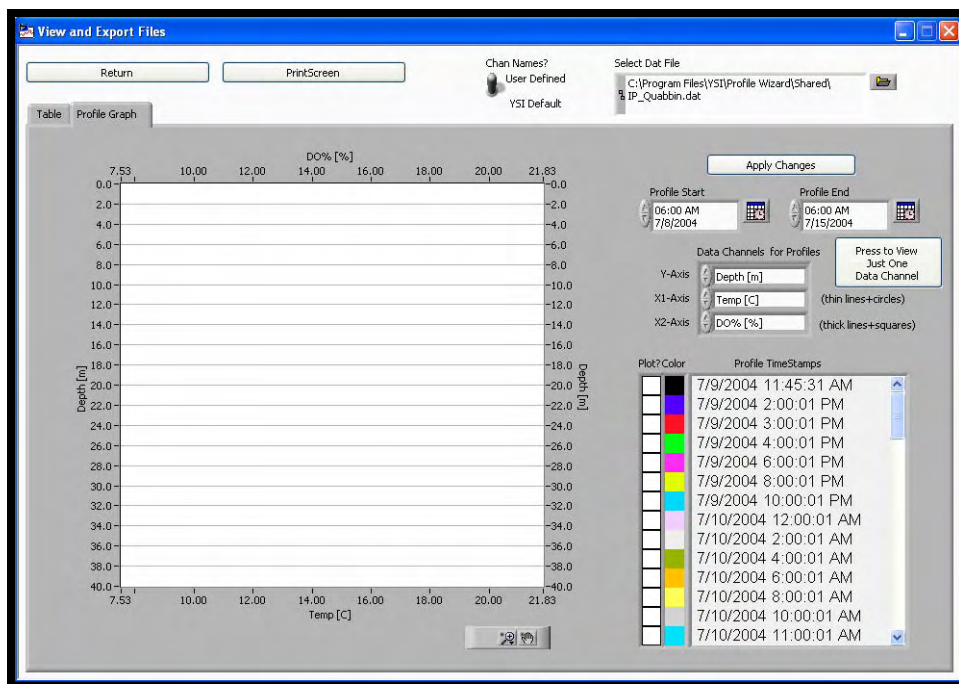


Figure 7-5 Graph and Table time series and parameters selected.

Next click the white box next to the desired profile timestamp to plot it on the graph. An “X” appears when the parameter is selected (see Figure 7-6). If more than one box is checked, more than one date and time will be displayed. The color next to the box associates date/time with graphed parameter.

Click the Apply Changes button again to graph the parameters or implement any changes made. In the example below (Figure 7-6), temperature and dissolved oxygen have been plotted against depth. The thin line + circles shows the first x-parameter (Temp C), while the thick line + squares shows the second x-parameter (DO%).

We recommend that you choose a second date/time to add a second set of plots in a different color to the graph. Simply check another box in the Profile TimeStamps field and click Apply Changes again. The graph will refresh and you will see additional plots of Temp C and DO% for another date and time.

To clear the data and start again place your mouse anywhere on the graph and right click to view a box. One of the options is to Clear Graph. Left click on that option and the plots are cleared. You may then return to start another analysis.

If you would like to view the data in table (spreadsheet) format, find the tab labeled Table in the upper right portion of the screen (just to the left of Profile Graph). Click on this tab to view the table (see Figure 7-7).

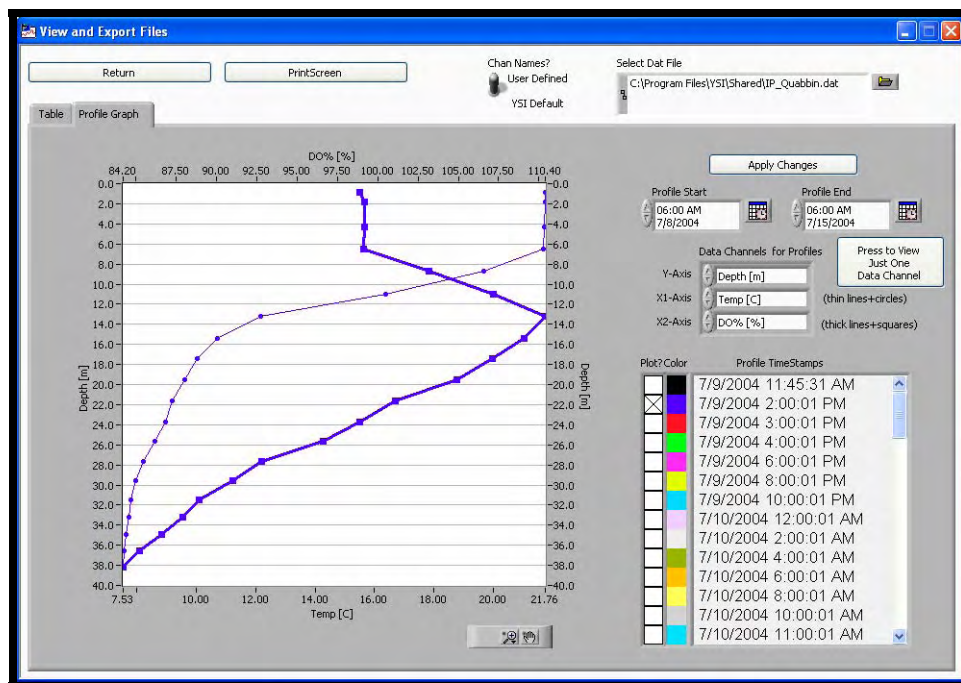


Figure 7-6 Plot of Temp C and DO% as function of Depth in meters for date/time selected

Depth [m]	Temp [C]	DO% [%]
38.14	7.53	84.20
36.59	7.57	85.20
34.93	7.64	86.60
33.19	7.73	87.90
31.46	7.80	88.90
29.57	7.96	91.00
27.63	8.22	92.80
25.62	8.60	96.60
23.70	8.96	98.90
21.59	9.18	101.10
19.48	9.60	104.90
17.39	10.03	107.10
15.41	10.70	109.10
13.23	12.18	110.40
11.05	16.37	107.20
8.75	19.68	103.20
6.52	21.68	99.10
4.30	21.72	99.20
1.86	21.76	99.20
0.88	21.76	98.90

Figure 7-7 Data in Table Format (note you can export table to a file)

7.4 Automation Setup

In this section you will learn how to use Profile Data Manager to create graphics of the profile parameters you have selected. You will also learn to configure FTP settings for graphics transmission. If you are starting from Windows Desktop double click the Profile Data Manager icon to view the Main screen as you did earlier in this section (see Figure 7-8). Alternatively, click on Start and locate Profile Data Manager under Start | Programs | YSI Profile Manager to view this screen.

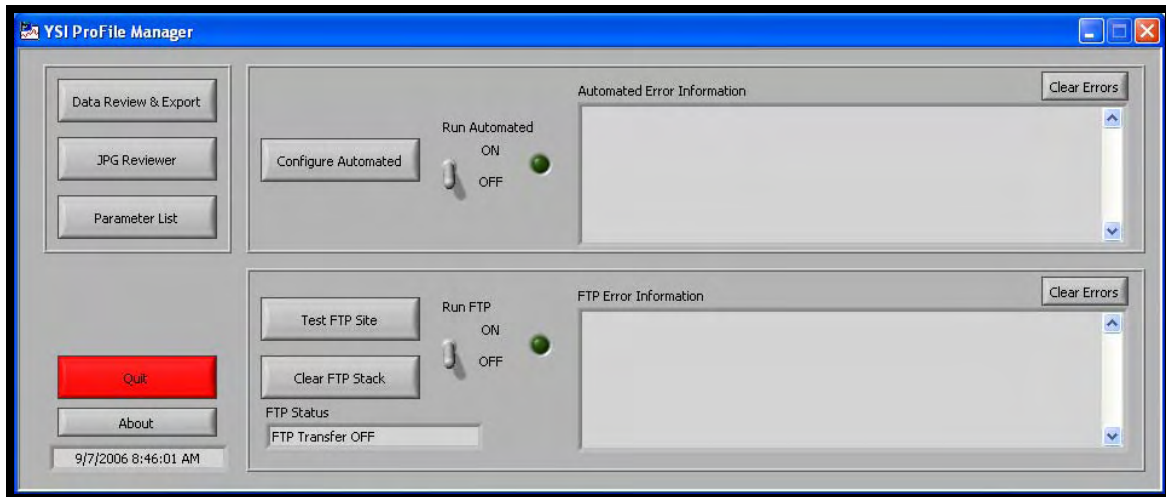


Figure 7-8 Main Screen of Profile Data Manager

Click the Configure Automated button in the upper right field of the screen. The button is on the left side of the field. The Configure Automated Stations window appears (Figure 7-9).

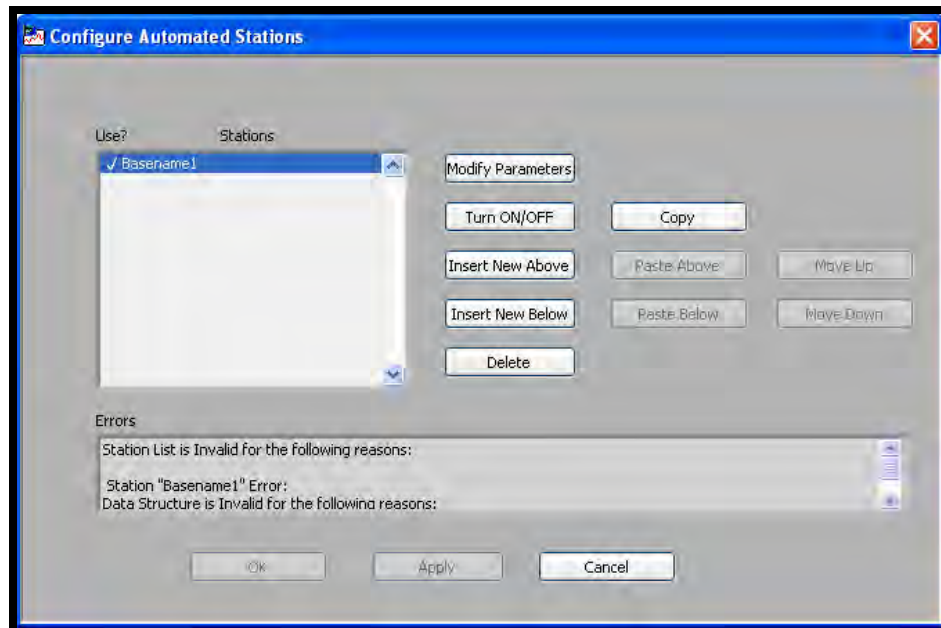


Figure 7-9 Configure Automated Stations

Click either Insert New Above or Insert New Below button. The default “Basename1” will appear in the Stations window on the left. Double-click the station name or click the Modify Parameters button for the Configure Single Station window to appear.

You need to create a station to associate the graphics you are about to create. We recommend naming the Automated Station with the same name as the station you setup in the LoggerNet application. In this example the Quabbin Reservoir site will be used.

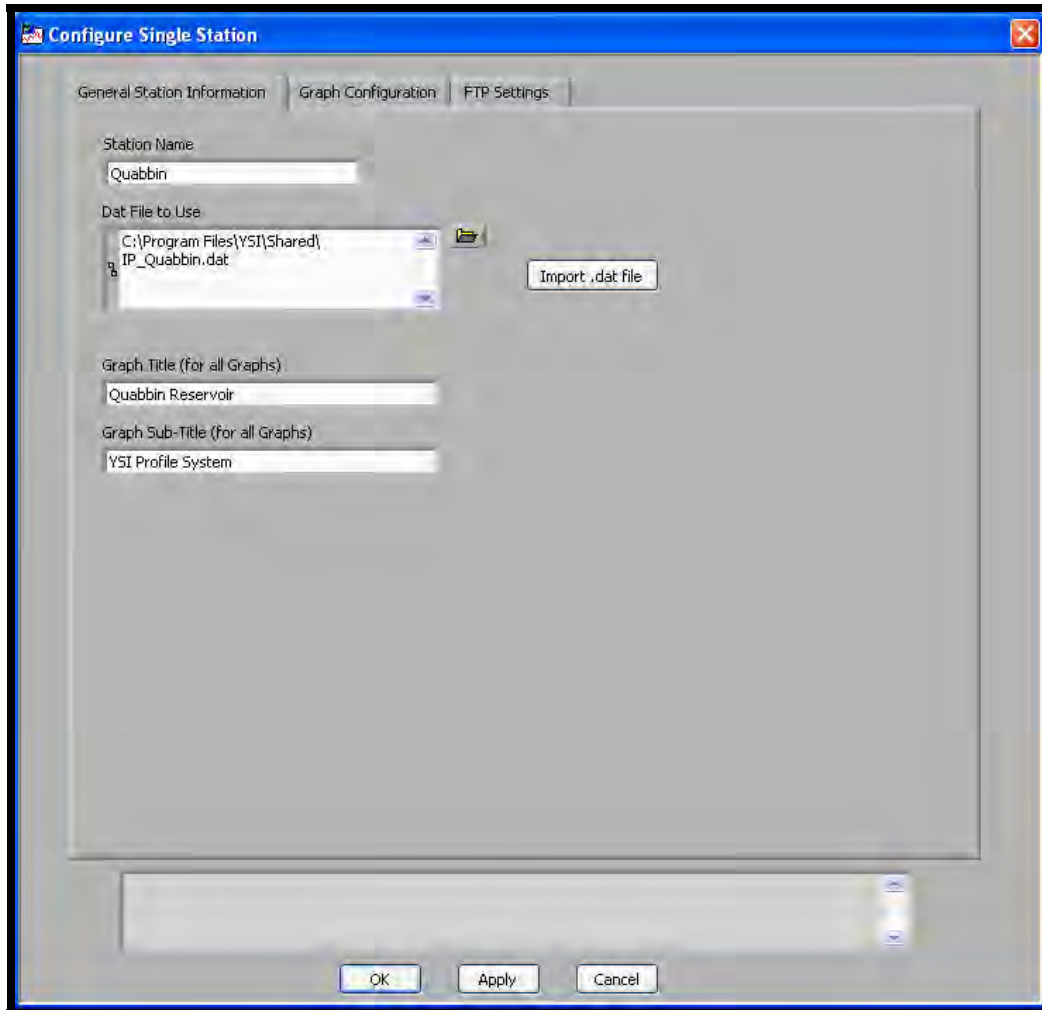



Figure 7-10 Configure Station Information screen

Setting up an automated station is a three (3) step process. You will use the three (3) tabs in the screen above (Figure 7-10). The setup requires that you:

1. Set up General Station Information and associate a data file with that station.
2. Set up parameters that you want to plot in the graphs. (Graph Configuration)
3. Indicate where to transfer the graphics. (FTP Settings)

You will start with entering information about the station. First, rename the station. Next, associate the data file you want this automated station to use by clicking the Import .dat file button or the browse  icon button and browse for the data file. Once the data file has been selected or imported, you may see a blue status bar appear briefly.

NOTE: For the YSI Profile Data Manager to import the data file correctly, an associated .LVI file needs to be in the same folder as data file. After browsing for the data file, if the OK, Apply and Cancel buttons are grayed out, this indicates that the .LVI is missing or the name does not match the data file.

Continue by entering a title and sub-title that you prefer to be displayed in all graphics created.

After you enter all of the general automation information, click on the Graph Configuration tab for the following window to appear.

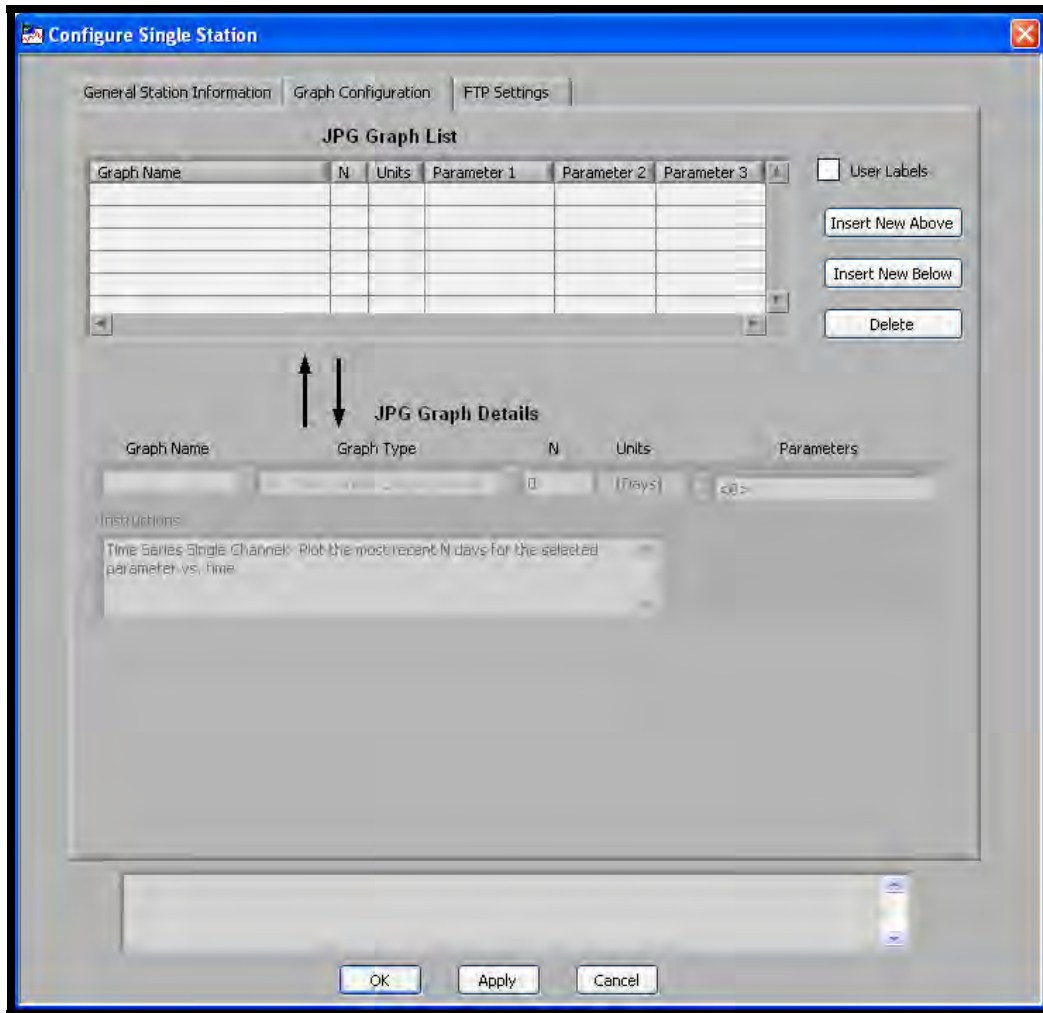


Figure 7-11 Graph Configuration

The Graph Configuration tab is composed of two sections. The top section (JPEG Graph List) keeps track of the current list of graphs associated with selected data files. The bottom section, JPG Graph Details, allows you to modify the parameters for the selected graphs. Since there is no specified graph selected the Graph Detail section is gray.

Click the Insert New Above or Insert New below buttons to create a new graph description. The order of the graphs on the Graph List determines the order the graphs are created and transmitted.

Next name your graph in the Graph Name box, and then select the graph type from the Graph Type dropdown menu. Alternatively, you can use the up/down arrows to the left of the Graph Typed box to scroll through the following graph types:

WindStick

Plots wind direction and speed

Profile – Single channel

Plots Depth verses one additional Profile parameter.

Profile – Dual Channel

Plots Depth verses 2 additional Profile parameters.

As you select the different graph types a description of the selected graph type appears in the Instructions window below it. Refer to Figure 7-12 for information described above. In this example Temperature and DO% are plotted as a function of Depth.

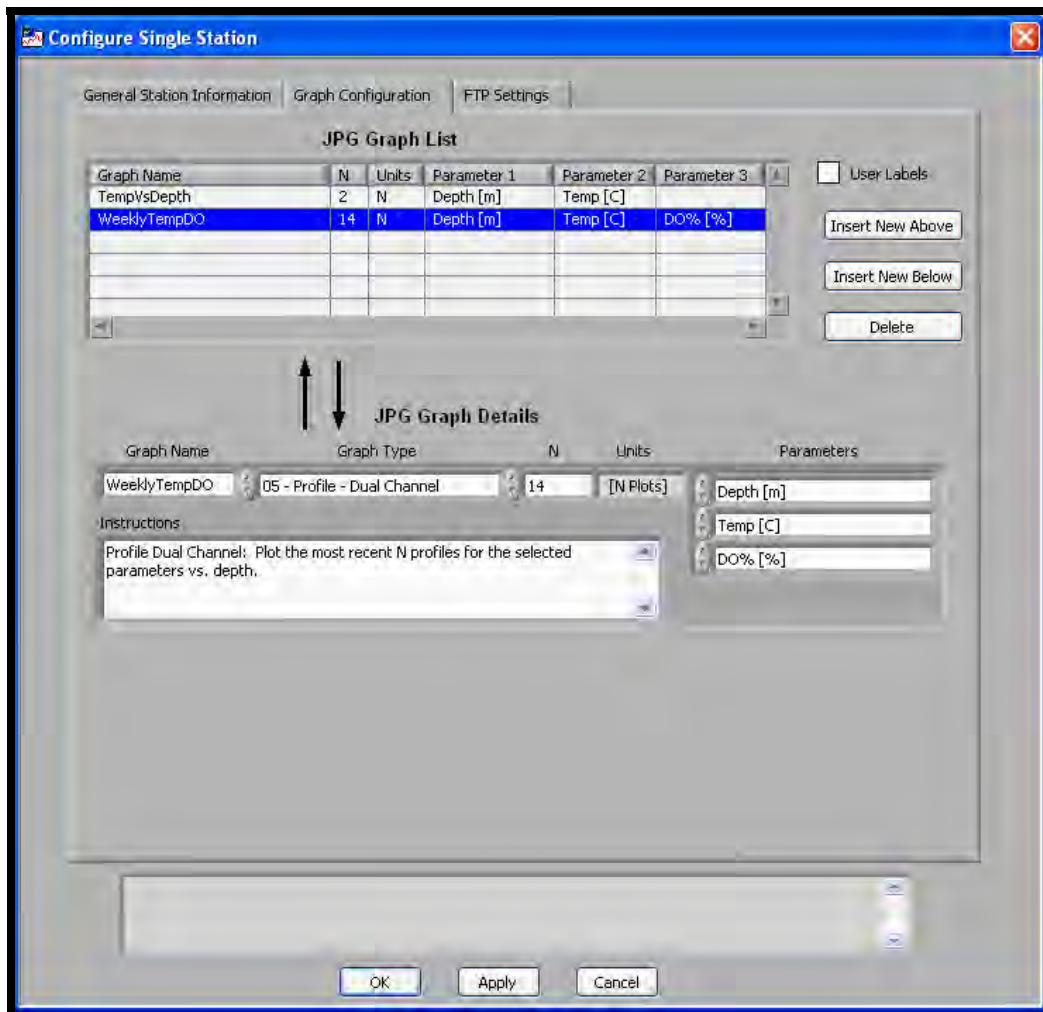


Figure 7-12 JPG Graph Details

Next choose the number of Profiles (N) to plot in this graphic. In the above example 14 profiles are entered. This number represents the *last* N profiles in your data file. The number you should enter here will depend on your profile interval and what type of data you are trying to graph.

For example, if you were trying to graph daily profiles and your profile interval is every 12 hours, you would enter 2 for the (N) number of profiles to graph. Profile Data Manager will create a graph with the last 2 profiles, and that should represent your daily profiles.

Create as many graphs as you need. Once all your graphics are setup click on the FTP Settings tab to view the following window (Figure 7-13).

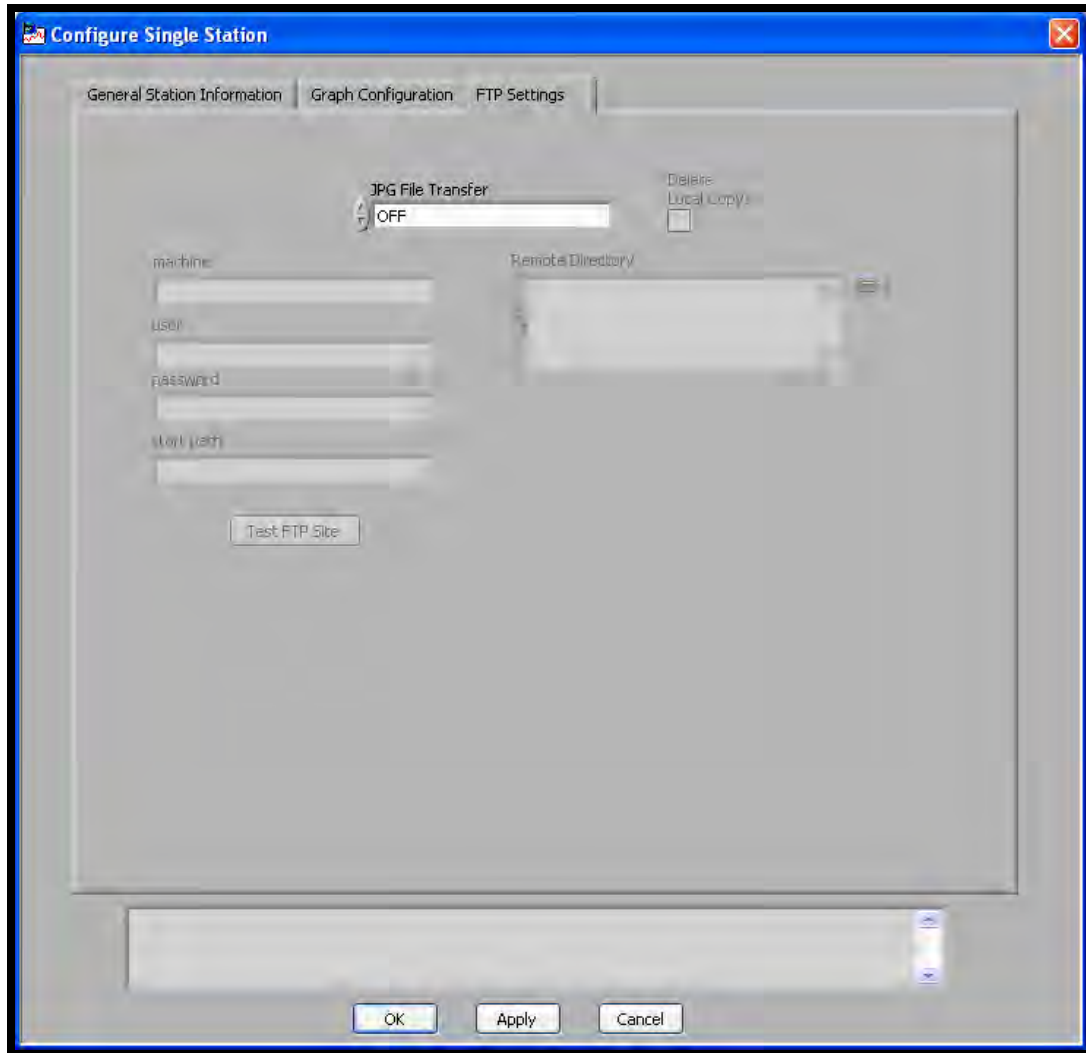
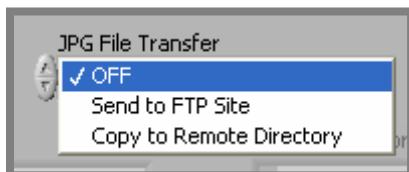


Figure 7-13 FTP Settings

The FTP Settings tab allows you to locate a folder on your local network (or on an FTP server) to which you can transfer your graphics.



Selecting the JPG File Transfer text box shows the dropdown menu. There are three (3) transfer options available. Alternatively, you can use the arrows to the left of the dropdown to scroll through the available options.

If you choose the 'Send to FTP Site' option click on that option, and additional text boxes become active (See Figure 7-14).

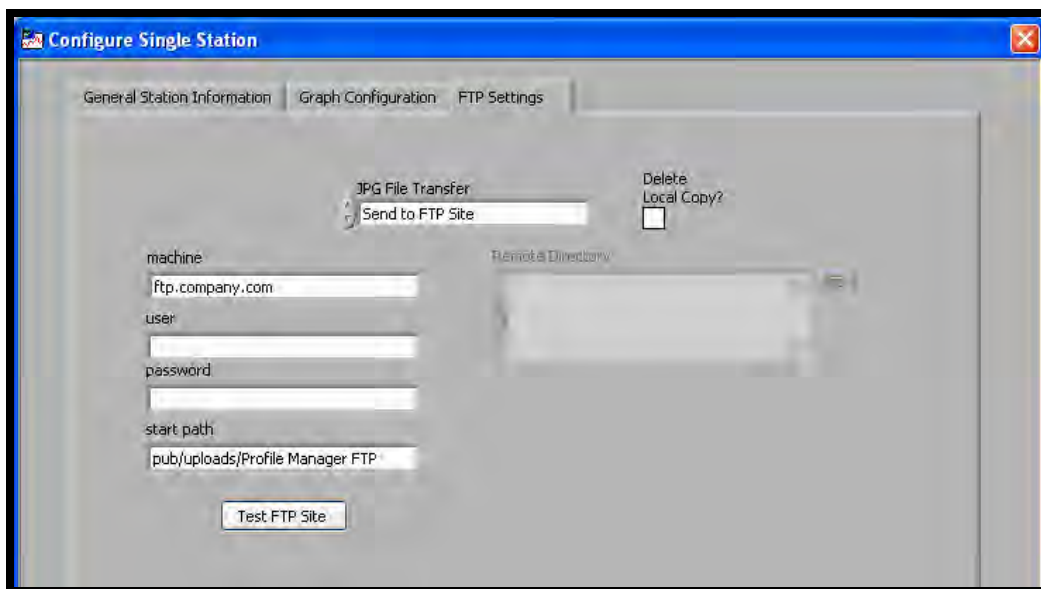


Figure 7-14 Send to FTP Site Option – Information required

Enter the FTP site address, the user name and your password in the appropriate text boxes. If you know the starting path you can also enter it at this time or you can browse for the graphics folder.

Click on the Delete Local Copy checkbox to delete the local copy after file transfer.

Click Test FTP Site button and the FTP Browser window will appear.

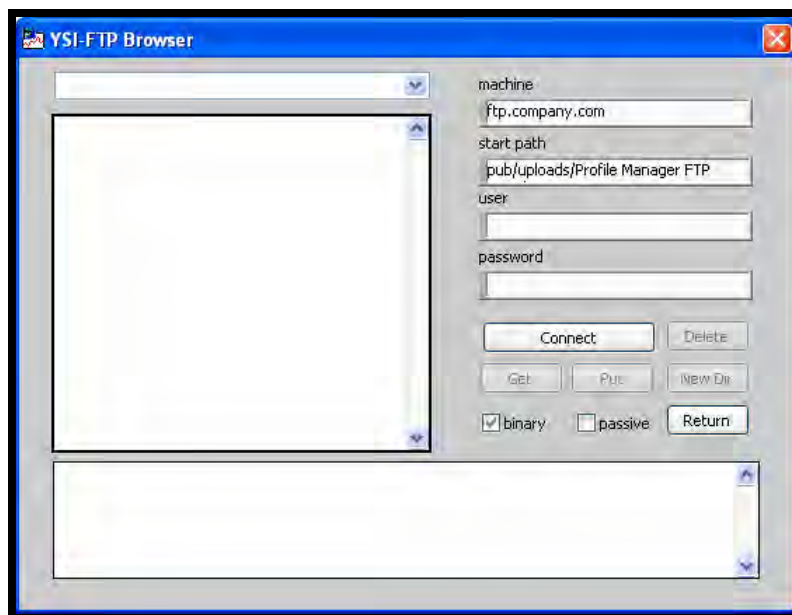


Figure 7-15 Information for FTP Site Option

If the start path, user name and password have not been entered, do so at this time.

NOTE:

To access a remote FTP site you need the address of the site, the directory where the files are going to be placed, a user name and a password with the appropriate security

privileges to access that folder. To obtain this information you may need to contact your IT manager or the person in charge of the FTP site.

Next click the Connect button to test the connection. If the connection fails, check the messages displayed in the lower text window. The messages will identify the reason for failure. See Figure 7-16.

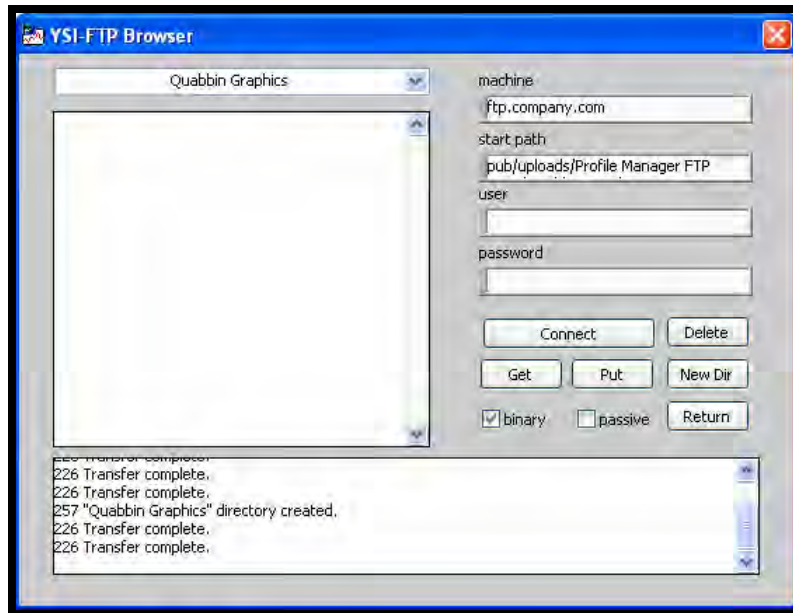


Figure 7-16 Test Connection for FTP Site

Once you are connected to the FTP site and you have appropriate privileges for the User Name you entered, you can continue browsing for the correct folder path or create a new folder on the FTP site by clicking the New Dir button.

Click the Return button to return to Configure Single Station window.

Then, click the OK button to return back to the Configure Automated Stations window. See Figure 7-17 below and read the next text below to complete your setup.

Note: If any error occurred during the Automated Station setup a description of the error will appear in the Error text window and the OK and Apply buttons would be disabled.

Now you have a station listed (Quabbin) and selected for automatic graphic creation. This is shown by the check mark before the station name. You may want to turn off an individual station from creating graphics when servicing the site or if an FTP server is down. To do so select the individual station name and click the Turn ON/OFF button. If the station is offline the check mark will disappear.

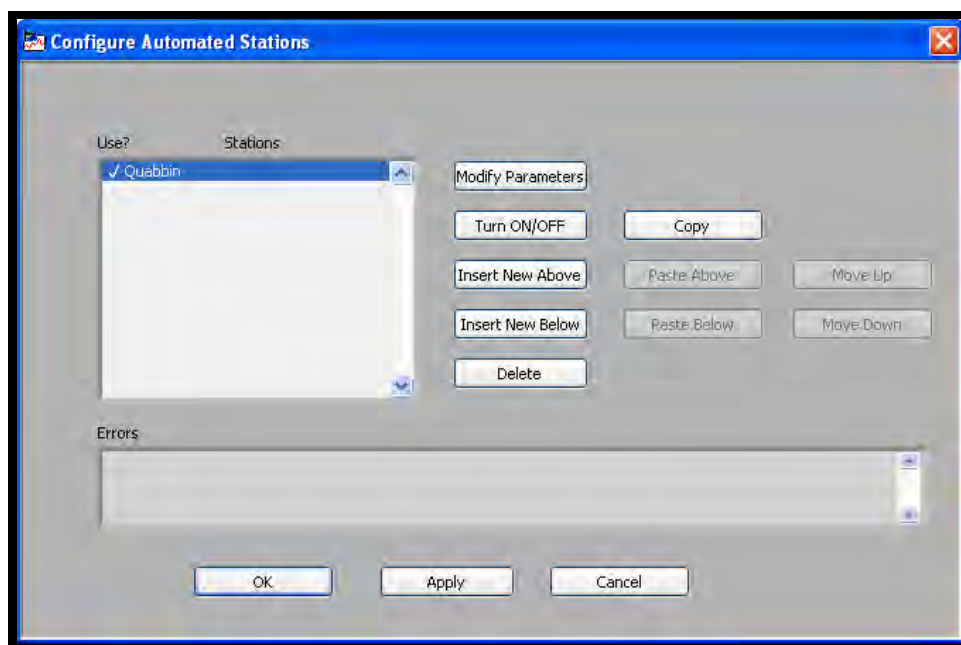


Figure 7-17 Completion of Automations Stations setup

You now have the basic instructions, with examples, for configuration of an Automated Station.

7.5 FTP Site Test

Click the OK button once more to return to the YSI Profile Data Manager Main display. Next toggle the Run Automated switch to ON. The LED light will turn green and you will see the graphs being generated in the upper left corner of your display. Any error(s) that is encountered during the graph generation process will appear in the Automated Error Information window.

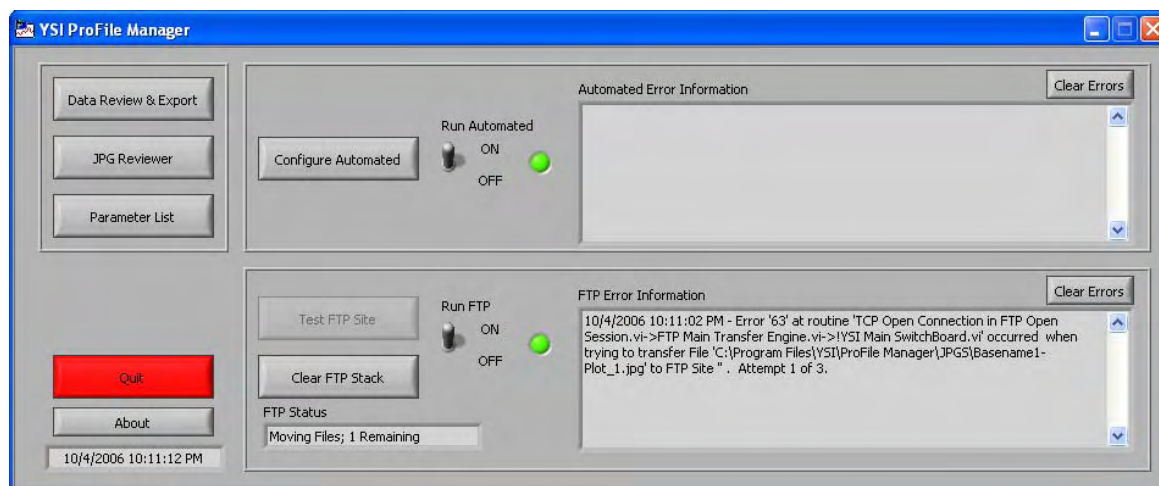


Figure 7-18 FTP Test Function

You can toggle the Run Automated switch OFF if you want to stop all automated processes setup earlier.

Next toggle the Run FTP switch ON. Again the LED light will turn green and file transfer will occur if no errors occur.

You can monitor the progress by looking at the FTP Status window which indicates the number of graphics left to transfer (see Figure 7-18). Any errors during transfer are displayed in the FTP Error Information window.

To stop the transfer of graphics click the Run FTP switch to the OFF position. Click on Clear Errors to clear the window once you have interpreted the errors.

You now have learned the basics through descriptions and examples of how to use YSI Profile Data Manager. Once you are set up and running practice using the setup and run screens to analyze and manage data collected during your YSI depth profile studies. If you have questions do not hesitate to contact YSI (refer to Appendix A for contact information).

Appendix A

Warranty & Service Information

The YSI Floating Profiling System is warranted for one (1) year from date of purchase by the end user against defects in materials and workmanship. YSI 6-Series Sondes carry specific warranties listed in the 6-Series Operations Manual. Within the warranty period YSI will repair or replace, at its sole discretion, free of charge, any product that YSI determines to be covered by this warranty.

To exercise this warranty, write or call your local YSI representative, or contact YSI Customer Service in Yellow Springs, Ohio. Send the product and proof of purchase, transportation prepaid, to the Authorized Service Center selected by YSI. Repair or replacement will be made and the product returned transportation prepaid. Repaired or replaced products are warranted for the balance of the original warranty period, or at least 90 days from date of repair or replacement.

LIMITATION OF WARRANTY

This Warranty does not apply to any YSI product damage or failure caused by:

- 1) failure to install, operate or use the product in accordance with YSI's written instructions;
- 2) abuse or misuse of the product;
- 3) failure to maintain the product in accordance with YSI's written instructions or standard industry procedure;
- 4) any improper repairs to the product;
- 5) use by you of defective or improper components or parts in servicing or repairing the product;
- 6) modification of the product in any way not expressly authorized by YSI.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. YSI'S LIABILITY UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT, AND THIS SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY DEFECTIVE PRODUCT COVERED BY THIS WARRANTY. IN NO EVENT SHALL YSI BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY DEFECTIVE PRODUCT COVERED BY THIS WARRANTY.

Ordering & Technical Support

Telephone:

(800) 363-3269 (Monday through Friday, 8:00 AM to 5:00 PM Eastern Time)

Fax:

(937) 767-9353 (orders)

(937) 767-1058 (technical support)

Email:

environmental@ysi.com

Mail:

Endeco/YSI Incorporated

13 Atlantis Drive

Marion, MA 02738

Internet:

www.ysi.com/environmental

When placing an order please have the following information available:

1. YSI account number (if available)
2. Name and Phone Number
3. Purchase Order or Credit Card
4. Model Number or Brief Description
5. Billing and Shipping addresses
6. Quantity

Service Information

YSI has several authorized service centers throughout the United States and Internationally. For the nearest service center information, please contact YSI Technical Support (800-897-4151).

Appendix B

Software File Report Formats

PFW Format

The PFW consists of variables that are used to recreate the DLD program file.

```
The Pfw
[wizard]
pflType=5
unitType=0
reelType=0
cableType=0
cableLen=0
winchHeight=2.000000
waterCol=4.000000
stepNum=1
stepDist=0.800000
stepType=1
profileNum=24
[profiler]
PFL_Max_Run=700
PFL_Direction=1
PFL_Start_Depth_X=0.500000
PFL_End_Depth_X=0.500000
PFL_Park_Depth_X=2.000000
PFL_Step_Interval=8.000000
PFL_INTVL_Time=60
PFL_Cable_length=15
PFL_NO_DFINDER_Depth=0.000000
MET_solarRadiationCoeff=90.099998
file=C:\profiler_testing\BIRD_ISLAND.dld
[labview]
FileType=0
N_Entries=2
Date="10/21/2004 12:12:43"
MetOrder=56,42,159,26,83,81,154,0,0,0,0,0,0,0,0,0,0,0,0,29,0,0,0,1000,0
ProfileOrder=1,6,4,12,14,15,96,22,18,17,203,193,28
hasMet=1
file=C:\Program Files\YSI\Profile Wizard\Shared\BIRD_ISLAND.lvi
```

LVI Format

The LVI is located within the directory Program Files\YSI\YSI Profile Wizard\Shared folder. This file is used by Labview to assign the Parameters.

```
[Misc]
FileType=0
N_Entries=1
[ParseVar_1]
Date="03/20/2005 10:57:51"
MetOrder=0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,29,0,0,0,1000,0
ProfileOrder=1,4,12,14,15,96,22,18,17,203,194,28
hasMet=0
```

DLD Format

The DLD is the actual CR10X program. This file resides in the Profile Wizard default directory or wherever you may have directed the path during the Profile Wizard execution.

RPT Format

The RPT is the Profile Wizard summary report.

Program file: C:\Documents and Settings\jsmith\My Documents\ABC123.dld
Profiling Direction: Bottom to top
Cable Length: 15 meter(s)
Max Water Depth: 4.90 meter(s)
Start Depth: 4.50 meter(s) from water surface.
End Depth: 0.50 meter(s) from water surface.
Distance per profile step: 1.00 meter(s) (~4 steps)
Daily Profiles: 96 (every 15 minutes)
No MET sensors.

Estimated time per profile: ~10 (minutes)

Sonde parameter report output

Temp (C)
Cond (mS/cm)
Sal (PPT)
DOsat (%)
DO (mg/L)
DOChrg (DOchrg)
Depth (meters)
pH (pH)
pH (mV)
Turbid+ (NTU)
%Fluorescence (%FS)
Battery (volts)

Appendix C

I/O Module Configuration

The SDM SIO4 module needs configured before it can be used. Connect the I/O module to 12 VDC (either a battery or the 6960 main power). The STATUS indicator should turn on briefly after power up. Connect a PC to the I/O module at Port 1. You will need a female/female null adapter.

Start Hyperterminal and then select the PC COM port. Set it to 9600 baud. Press the SDMSIO reset button, and the STATUS indicator should turn on. The unit will scroll SDMSIO4->. If these letters do not appear, either the power is not on or there may be a faulty RS-232 connection to the PC.

From the Hyperterminal menu select the Transfer button and then select SEND TEXT FILE. Locate the SDM_info .txt file and send it. You should see the following:

```
.....
portset 2 12 3 0 0 0 0
portset 3 11 3 0 0 0 0
portset 4 13 3 0 0 0 0
strst 1 " &0D&0A &0D&0A"
strst 3 "para&0D&0A"
strst 4 "exit&0D&0A"
strst 5 "data&0D&0A"
strst 9 "sleep&0D&0A"
strst 11 "run&0D&0A"
strst 12 "fltreset&0D&0A"
strst 15 "&1B&0D&0A"
strst 49 "&0D&0A&0D&0A&0D&0A"
strst 20 "*H&0D&0A"
strst 21 "*M&0D&0A"
strst 22 "*S&0D&0A"
strst 23 "*A&0D&0A"
strst 24 "*Q&0D&0A"
strst 25 "*C&0D&0A"
fltst 6 "ffffffffffffffffffff"
fltst 7 "zxt[$SDDBT,]t[,f,]FXz"
fltst 8 "xt[$SDDPT,]FXz"
fltst 10 "f"
fltst 50 "i[$]f"
fltst 51 "i[$]n6Fi[MfF]"
fltst 52 "F"
fltst 53 "FCF"
fltst 54 "zft[,]f"
fltst 55 "zfn1f"
fltst 56 "Ft[,]Ft[,]F"
fltst 57 "ft[,]ft[,]f"
exit
.....
```

At this point press enter and then power cycle the Profiler unit. Press the reset button. The unit should scroll the following header, SDMSIO4->. Type **Strrd 12** and press enter. You should see the following response SDMSIO4-> fltreset . Type **exit** escape (SDMSIO4->exit).

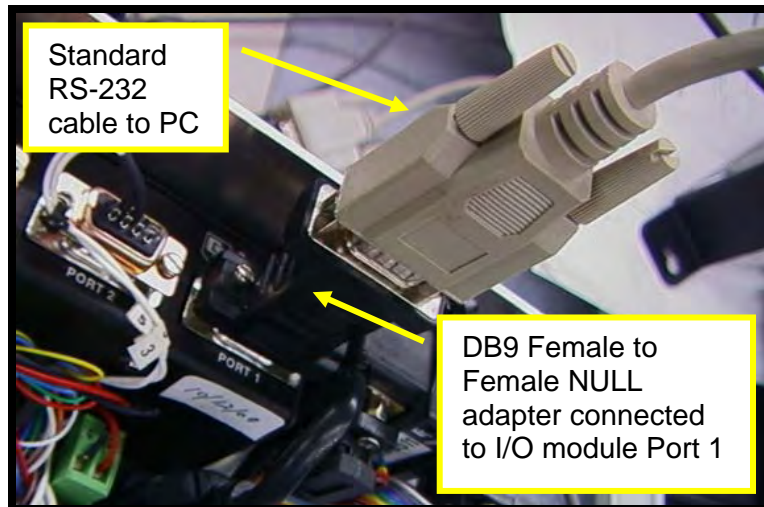


Figure C-1 Serial Connection: PC to I/O Module

Appendix D

YSI Parameter ID Number (CR10X)

When building a Numeric Display in LoggerNet™ Connect Screen, the following ID numbers are of particular interest if you are monitoring sonde parameters in testing or troubleshooting situations.

YSI Parameter #	YSI Parameter Name	Units
1	Temp	C
2	Temp	F
3	Temp	K
4	Cond	mS/cm
5	Cond	uS/cm
6	SpCond	mS/cm
7	SpCond	uS/cm
8	Resist	Kohm*cm
9	Resist	MOhm*cm
10	TDS	g/L
12	Sal	ppt
14	DOsat	%
15	DO	mg/L
17	pH	mV
18	pH	
19	ORP	mV
22	Depth	meters
23	Depth	feet
28	Battery	volts
32	Density	Kg/m ³
37	Turbid	NTU
47	NH3 N	mg/L
48	NH4+ N	mg/L
54	Time	hh:mm:ss
94	Resist	Ohm*cm
95	TDS	Kg/L
96	DOchrg	
101	NO3- N	mV
106	NO3- N	mg/L
107	NH3 N	mV
108	NH4+ N	mV
112	Cl-	mg/L
118	Flow	ft ³ /sec
119	Flow	gal/min
120	Flow	Mgal/day
121	Flow	m ³ /sec
122	Flow	L/sec
	YSI	Units

YSI Parameter #	Parameter Name	
123	Volume	ft3
124	Volume	gal
125	Volume	m3
126	Volume	L
145	Cl-	mV
153	Date	m/d/y
164	Flow	gal/sec
165	Flow	gal/hour
166	Flow	ft3/min
167	Flow	ft3/hour
168	Flow	ft3/day
169	Flow	m3/min
170	Flow	m3/hour
171	Flow	m3/day
172	Flow	AF/day
173	Volume	Mgal
174	Volume	acre*ft
193	Chl	ug/L
194	Chl	RFU
200	Dosat	%Local
201	PAR1	
202	PAR2	
203	Turbid+	NTU
204	Rhodamine	ug/l
208	Turbid-	NTU
209	Free Cl2	
210	Cl2 chrg	
211	ODOsat	%
212	ODO	mg/L
214	ODOsat	%Local
215	BGA PC	cells/mL
216	BGA PC	RFU
217	BGA PE	cells/mL
218	BGA PE	RFU

Appendix E

Required Notice

The Federal Communications Commission defines this product as a computing device and requires the following notice.

This equipment generates and uses radio frequency energy and if not installed and used properly, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class A or Class B computing device in accordance with the specification in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- ◆ Reorient the receiving antenna
- ◆ Relocate the computer with respect to the receiver
- ◆ Move the computer away from the receiver
- ◆ Plug the computer into a different outlet so that the computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet, prepared by the Federal Communications Commission, helpful: "How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No.0004-000-00345-4.

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Appendix F

Material Data Safety Sheet(s)

Winch Assembly Gearbox contains the following lubricant. The gearbox is maintenance-free, and the compartment should not be opened for any reason.

602920-00 MOBIL SHC 624
MATERIAL SAFETY DATA BULLETIN

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: MOBIL SHC 624
SUPPLIER: EXXONMOBIL OIL CORPORATION
3225 GALLOWS RD.
FAIRFAX, VA 22037
24 - Hour Health and Safety Emergency (call collect): 609-737-4411
24 - Hour Transportation Emergency:
CHEMTREC: 800-424-9300 202-483-7616
LUBES AND FUELS: 281-834-3296
Product and Technical Information:
Lubricants and Specialties: 800-662-4525 800-443-9966
Fuels Products: 800-947-9147
MSDS Fax on Demand: 713-613-3661
MSDS Internet Website: <http://www.exxon.com>, <http://www.mobil.com>

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAMES AND SYNONYMS: SYN. HYDROCARBONS AND ADDITIVES
GLOBALLY REPORTABLE MSDS INGREDIENTS:
None.
See Section 8 for exposure limits (if applicable).

3. HAZARDS IDENTIFICATION

Under normal conditions of use, this product is not considered hazardous according to regulatory guidelines (See section 15).
EMERGENCY OVERVIEW: Orange Liquid. DOT ERG No. : NA
POTENTIAL HEALTH EFFECTS: Under normal conditions of intended use, this product does not pose a risk to health. Excessive exposure may result in eye, skin or respiratory irritation.
For further health effects/toxicological data, see Section 11.

4. FIRST AID MEASURES

EYE CONTACT: Flush thoroughly with water. If irritation occurs, call a physician.
SKIN CONTACT: Wash contact areas with soap and water. Remove and clean oil soaked clothing daily and wash affected area. (See Section 16 - Injection Injury)

INHALATION: Not expected to be a problem. However, if respiratory irritation, dizziness, nausea, or unconsciousness occurs due to excessive vapor or mist exposure, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or mouth-to-mouth resuscitation.

INGESTION: Not expected to be a problem. Seek medical attention if discomfort occurs. Do not induce vomiting.

5. FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA: Carbon dioxide, foam, dry chemical and water fog.

SPECIAL FIRE FIGHTING PROCEDURES: Water or foam may cause frothing. Use water to keep fire exposed containers cool. Water spray may be used to flush spills away from exposure. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply.

SPECIAL PROTECTIVE EQUIPMENT: For fires in enclosed areas, fire fighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: None.

COMBUSTION PRODUCTS: Fumes, smoke, carbon monoxide, sulfur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

Flash Point C(F): > 210(410) (ASTM D-93).

Flammable Limits (approx.% vol.in air) - LEL: 0.9%, UEL: 7.0%

NFPA HAZARD ID: Health: 0, Flammability: 1, Reactivity: 0

6. ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES: Report spills/releases as required to appropriate authorities. U.S. Coast Guard and EPA regulations require immediate reporting of spills/releases that could reach any waterway including intermittent dry creeks. Report spill/release to Coast Guard National Response Center toll free number (800)424-8802. In case of accident or road spill notify CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

LAND SPILL: Shut off source taking normal safety precautions. Take measures to minimize the effects on ground water. Recover by pumping or contain spilled material with sand or other suitable absorbent and remove mechanically into containers. If necessary, dispose of adsorbed residues as directed in Section 13.

WATER SPILL: Confine the spill immediately with booms. Warn other ships in the vicinity. Notify port and other relevant authorities. Remove from the surface by skimming or with suitable absorbents. If permitted by regulatory authorities the use of suitable dispersants should be considered where recommended in local oil spill procedures.

ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewers, water sources or low lying areas; advise the relevant authorities if it has, or if it contaminates soil/vegetation.

PERSONAL PRECAUTIONS: See Section 8

7. HANDLING AND STORAGE

HANDLING: No special precautions are necessary beyond normal good hygiene practices. See Section 8 for additional personal protection advice when handling this product.

STORAGE: Keep containers closed when not in use. Do not store in open or unlabelled containers. Store away from strong oxidizing agents and combustible materials. Do not store near heat, sparks, flame or strong oxidants.

SPECIAL PRECAUTIONS: Prevent small spills and leakages to avoid slip hazard.

EMPTY CONTAINER WARNING: Empty containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to refill or clean container since residue is difficult to remove. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS:

When mists/aerosols can occur, the following are recommended: 5 mg/m³ (as oil mist)- ACGIH Threshold Limit Value (TLV), 10 mg/m³ (as oil mist) - ACGIH Short Term Exposure Limit (STEL), 5 mg/m³ (as oil mist) - OSHA Permissible Exposure Limit (PEL)

VENTILATION: If mists are generated, use adequate ventilation, local exhaust or enclosures to control below exposure limits.

RESPIRATORY PROTECTION: If mists are generated, and/or when ventilation is not adequate, wear approved respirator.

EYE PROTECTION: If eye contact is likely, safety glasses with side shields or chemical type goggles should be worn.

SKIN PROTECTION: Not normally required. When splashing or liquid contact can occur frequently, wear oil resistant gloves and/or other protective clothing. Good personal hygiene practices should always be followed.

9. PHYSICAL AND CHEMICAL PROPERTIES

Typical physical properties are given below. Consult Product Data Sheet for specific details.

APPEARANCE: Liquid

COLOR: Orange

ODOR: Mild

ODOR THRESHOLD-ppm: NE

pH: NA

BOILING POINT C(F): > 316(600)

MELTING POINT C(F): NA

FLASH POINT C(F): > 210(410) (ASTM D-93)

FLAMMABILITY (solids): NE

AUTO FLAMMABILITY C(F): NA

EXPLOSIVE PROPERTIES: NA

OXIDIZING PROPERTIES: NA

VAPOR PRESSURE-mmHg 20 C: < 0.1

VAPOR DENSITY: > 2.0

EVAPORATION RATE: NE

RELATIVE DENSITY, 15/4 C: 0.86-1

SOLUBILITY IN WATER: Negligible

PARTITION COEFFICIENT: > 3.5

VISCOSITY AT 40 C, cSt: > 20.0

VISCOSITY AT 100 C, cSt: NE
POUR POINT C(F): < -48(-55)
FREEZING POINT C(F): NE
VOLATILE ORGANIC COMPOUND: NE
DMSO EXTRACT, IP-346 (WT.%): <3, for mineral oil only
NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES
FOR FURTHER TECHNICAL INFORMATION, CONTACT YOUR MARKETING REPRESENTATIVE

10. STABILITY AND REACTIVITY

STABILITY (THERMAL, LIGHT, ETC.): Stable.
CONDITIONS TO AVOID: Extreme heat and high energy sources of ignition.
INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: Product does not decompose at ambient temperatures.
HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL DATA

---ACUTE TOXICOLOGY---

ORAL TOXICITY (RATS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

DERMAL TOXICITY (RABBITS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

INHALATION TOXICITY (RATS): Practically non-toxic (LC50: greater than 5 mg/l). ---Based on testing of similar products and/or the components.

EYE IRRITATION (RABBITS): Practically non-irritating. (Draize score: greater than 6 but 15 or less). ---Based on testing of similar products and/or the components.

SKIN IRRITATION (RABBITS): Practically non-irritating. (Primary Irritation Index: greater than 0.5 but less than 3). ---Based on testing of similar products and/or the components.

OTHER ACUTE TOXICITY DATA: Although an acute inhalation study was not performed with this product, a variety of mineral and synthetic oils, such as those in this product, have been tested. These samples had virtually no effect other than a nonspecific inflammatory response in the lung to the aerosolized mineral oil. The presence of additives in other tested formulations (in approximately the same amounts as in the present formulation) did not alter the observed effects.

---SUBCHRONIC TOXICOLOGY (SUMMARY)---

No significant adverse effects were found in studies using repeated dermal applications of similar formulations to the skin of laboratory animals for 13 weeks at doses significantly higher than those expected during normal industrial exposure. The animals were evaluated extensively for effects of exposure (hematology, serum chemistry, urinalysis, organ weights, microscopic examination of tissues etc.).

---REPRODUCTIVE TOXICOLOGY (SUMMARY)---

No teratogenic effects would be expected from dermal exposure, based on laboratory developmental toxicity studies of major components in this formulation and/or materials of similar composition.

---CHRONIC TOXICOLOGY (SUMMARY)---

Repeated and/or prolonged exposure may cause irritation to the skin, eyes or respiratory tract. Overexposure to oil mist may result in oil droplet deposition and/or granuloma formation. For

mineral base oils: Base oils in this product are severely solvent refined and/or severely hydrotreated. Chronic mouse skin painting studies of severely treated oils showed no evidence of carcinogenic effects. These results are confirmed on a continuing basis using various screening methods such as Modified Ames Test, IP-346, and/or other analytical methods. For synthetic base oils: The base oils in this product have been tested in the Ames assay and other tests of mutagenicity with negative results. These base oils are not expected to be carcinogenic with chronic dermal exposures.

---SENSITIZATION (SUMMARY)---

Not expected to be sensitizing based on tests of this product, components, or similar products.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE AND EFFECTS:

In the absence of specific environmental data for this product, this assessment is based on information for representative products.

ECOTOXICITY: Available ectotoxicity data (LL50 >1000 mg/L) indicates that adverse effects to aquatic organisms are not expected from this product.

MOBILITY: When released into the environment, adsorption to sediment and soil will be the predominant behavior.

PERSISTENCE AND DEGRADABILITY: This product is expected to be inherently biodegradable.

BIOACCUMULATIVE POTENTIAL: Bioaccumulation is unlikely due to the very low water solubility of this product, therefore bioavailability to aquatic organisms is minimal.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: Product is suitable for burning in an enclosed, controlled burner for fuel value. Such burning may be limited pursuant to the Resource Conservation and Recovery Act. In addition, the product is suitable for processing by an approved recycling facility or can be disposed of at an appropriate government waste disposal facility. Use of these methods is subject to user compliance with applicable laws and regulations and consideration of product characteristics at time of disposal.

RCRA INFORMATION: The unused product, in our opinion, is not specifically listed by the EPA as a hazardous waste (40 CFR, Part 261D), nor is it formulated to contain materials which are listed hazardous wastes. It does not exhibit the hazardous characteristics of ignitability, corrosivity, or reactivity. The unused product is not formulated with substances covered by the Toxicity Characteristic Leaching Procedure (TCLP). However, used product may be regulated.

14. TRANSPORT INFORMATION

USA DOT: NOT REGULATED BY USA DOT.

RID/ADR: NOT REGULATED BY RID/ADR.

IMO: NOT REGULATED BY IMO.

IATA: NOT REGULATED BY IATA.

STATIC ACCUMULATOR (50 picosiemens or less): YES

15. REGULATORY INFORMATION

US OSHA HAZARD COMMUNICATION STANDARD: When used for its intended purposes, this product is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

EU Labeling: Product is not dangerous as defined by the European Union Dangerous Substances/Preparations Directives. EU labeling not required.

Governmental Inventory Status: All components comply with TSCA, EINECS/ELINCS, and DSL.

U.S. Superfund Amendments and Reauthorization Act (SARA) Title III:

This product contains no "EXTREMELY HAZARDOUS SUBSTANCES".

SARA (311/312) REPORTABLE HAZARD CATEGORIES: None.

This product contains no chemicals subject to the supplier notification requirements of SARA (313) toxic release program.

THIS PRODUCT HAS BEEN AUTHORIZED BY USDA FOR USE UNDER THE FOLLOWING CATEGORY: This product is acceptable as a lubricant where there is no possibility of food contact (complies with earlier USDA guidelines for H-2 lubricant use).

The following product ingredients are cited on the lists below:

CHEMICAL NAME CAS NUMBER LIST CITATIONS *

NAPHTHALENE (COMPONENT ANALYSIS) 91-20-3 16, 22
(<0.02%)

--- REGULATORY LISTS SEARCHED ---

1=ACGIH ALL 6=IARC 1 11=TSCA 4 16=CA P65 CARC 21=LA RTK

2=ACGIH A1 7=IARC 2A 12=TSCA 5a2 17=CA P65 REPRO 22=MI 293

3=ACGIH A2 8=IARC 2B 13=TSCA 5e 18=CA RTK 23=MN RTK

4=NTP CARC 9=OSHA CARC 14=TSCA 6 19=FL RTK 24=NJ RTK

5=NTP SUS 10=OSHA Z 15=TSCA 12b 20=IL RTK 25=PA RTK

26=RI RTK

* EPA recently added new chemical substances to its TSCA Section 4 test rules. Please contact the supplier to confirm whether the ingredients in this product currently appear on a TSCA 4 or TSCA 12b list.

Code key:CARC=Carcinogen; SUS=Suspected Carcinogen; REPRO=Reproductive

16. OTHER INFORMATION

USE: LUBRICANT

NOTE: PRODUCTS OF EXXON MOBIL CORPORATION AND ITS AFFILIATED COMPANIES ARE NOT FORMULATED TO CONTAIN PCBS.

Health studies have shown that many hydrocarbons pose potential human health risks which may vary from person to person. Information provided on this MSDS reflects intended use. This product should not be used for other applications. In any case, the following advice should be considered:

INJECTION INJURY WARNING: If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

INDUSTRIAL LABEL

Under normal conditions of intended use, this product does not pose a risk to health. Excessive exposure may result in eye, skin or respiratory irritation. Always observe good hygiene measures. First Aid: Wash skin with soap and water. Flush eyes with water. If

overcome by fumes or vapor, remove to fresh air. If ingested do not induce vomiting. If symptoms persist seek medical assistance. Read and understand the MSDS before using this product.

*

For Internal Use Only: MHC: 1* 1* 1* 1* 1*, MPPEC: A, TRN: 602920-00,
ELIS: 400377, CMCS97: 970382, REQ: US - MARKETING, SAFE USE: L
EHS Approval Date: 04APR2002

*

Information given herein is offered in good faith as accurate, but without guarantee. Conditions of use and suitability of the product for particular uses are beyond our control; all risks of use of the product are therefore assumed by the user and WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. Nothing is intended as a recommendation for uses which infringe valid patents or as extending license under valid patents. Appropriate warnings and safe handling procedures should be provided to handlers and users. Alteration of this document is strictly prohibited. Except to the extent required by law, republication or retransmission of this document, in whole or in part, is not permitted. Exxon Mobil Corporation and its affiliated companies assume no responsibility for accuracy of information unless the document is the most current available from an official ExxonMobil distribution system. Exxon Mobil Corporation and its affiliated companies neither represent nor warrant that the format, content or product formulas contained in this document comply with the laws of any other country except the United States of America.

Prepared by: ExxonMobil Oil Corporation

Environmental Health and Safety Department, Clinton, USA

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Appendix G

Data File Array Numbers

In the tables below array numbers are each matched with a description. These array numbers are found in the Profile data file during a standard profile operation for template **Version r4.10**.

NOTE:

Improvements in the future may require changes and/or additions to the array number lists below. Please contact Endeco/YSI if you are unsure of the version you have.

Standard Operations	
Array No.	Description
6	Depth sounder reading
60	Hourly MET reading
88	Finds the Profile sonde depth location
99	Profile time stamp – found at beginning and end of a profile
105	Profile sonde reading
160	Profile sonde hourly reading
241	Daily MET average
242	Daily MET maximum
243	Daily MET minimum
325	CR10X internal variables reading
400	Battery voltage warning
511	Error Code – indicates the error number that caused the profile to abort

During nonstandard operations (Debug operations) additional array numbers will be collected in the data file. Below are some examples of the most frequently used array numbers.

Debug Operations	
Array No.	Description
1	Profiles sonde SDI12 reading
5	Profiles sonde RS232 reading
7	Updates the direction and the distance the sonde will move
8	Moving subroutine
91	Compass reading

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Appendix H

Supplementary Information

This appendix contains specific information that is relevant to your deployment and/or application. Refer to the attached documents in your manual package.

Document Number	Date & Rev	Document Title	Initial

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